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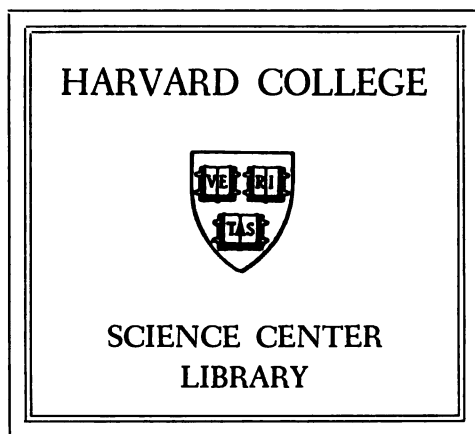
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~~Sci 320.5 (1869)~~

Per 2208













# THE AMERICAN NAUTICAL ALMANAC

3K,

Nautical Almanac Office,  
Cambridge, Mass.,

Washington D.C. Dec 16 1867

CITY.

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NS,

Dear Sir,---

A copy of  
Am. Ephemeris & Nautical Almanac  
for 1869

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R.

, MD

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has been sent to you  
by mail for Library, Harvard College.

, VA.

VA.

Please acknowledge the receipt.

, N. C.

Yours truly,

, S. C.

CO.,

J. H. C. Coffin

GA.

NINGHAM

LA.

Sup't Naut. Alm.

Rev J. Langdon Sibley  
Librarian Harvard College  
Cambridge, Mass

IS, LA.

V. S.

ENG.



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THE  
**AMERICAN EPHEMERIS**

AND  
**NAUTICAL ALMANAC,**

FOR THE YEAR

**1869.**

**PUBLISHED BY AUTHORITY OF THE SECRETARY OF THE NAVY.**

From Office of the  
**AMERICAN EPHEMERIS**  
and  
**NAUTICAL ALMANAC**

**BUREAU OF NAVIGATION,  
WASHINGTON.**

**1867.**

130.4

.Sci 320.5 (1869)

Per 1208

1867. Dec. 19

Off. of

J. K. C. Coffin,  
Superintendent.



NOTICE.

The Office of the American Ephemeris and Nautical Almanac has been transferred from Cambridge, Mass., to Washington, D. C

69541  
51.181  
24.6

## PREFACE.

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THE preparation of the American Ephemeris and Nautical Almanac was begun in the latter part of the year 1849, in accordance with an act of Congress, approved on the 3d of March of that year. An account of this preparation and the values of the constants adopted will be found in the Preface and Appendix of the first volume, for the year 1855.

In the volume for 1865 the Star Ephemeris was greatly enlarged; new places of the Stars adopted; the form for Moon Culminations and Moon-Culminating Stars changed so that less space was required; Mean Solar Time, instead of Sidereal Time, used in the dates of the Ephemeris for the Meridian of Washington; BESSEL's notation in the formulæ for star-reductions substituted for BAILY's; and several other changes of less importance were made.

In the present volume the Ephemerides of Venus and Mars are made to conform more rigidly to the adopted elements; the Stars arranged in the order of their right ascensions; the Ephemeris of 51 Cephei, instead of  $\epsilon$  Ursæ Minoris, given for each day; the explanations of the arrangement and use of the Tables revised, so as to adapt them to the wants of operators at sea or in the field, who are out of reach of other sources of information; and several statements in the Appendix corrected.

Tables for correcting  $A$  and  $B$  for small terms of nutation; Reductions of Star-Places in the volumes for 1865-9 to those adopted in the volume for 1870; an Ephemeris of Neptune for 1866-9 derived from Professor NEWCOMB's Tables; and a list of Occultations in 1868 and 1869, visible in the Territory of the United States west of the Mississippi river, have been added to the Appendix.

J. H. C. COFFIN,  
*Prof. Math. U. S. Navy, Superintendent.*

WASHINGTON, September 1, 1867



# THE AMERICAN NAUTICAL ALMANAC

IK,

Nautical Almanac Office,  
Cambridge, Mass.,

Washington D.C. Dec 16 1867

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# CHRONOLOGICAL ERAS AND CYCLES.

## CHRONOLOGICAL ERAS.

THE YEAR 1869, WHICH COMPRISES THE LATTER PART OF THE 93<sup>d</sup> AND THE BEGINNING OF THE 94<sup>th</sup> YEAR OF THE INDEPENDENCE OF THE UNITED STATES OF AMERICA, CORRESPONDS TO—

The year 6582 of the Julian Period;

“ 7377–78 of the Byzantine era;

“ 5629–30 of the Jewish era;

“ 2622 since the foundation of Rome, according to Varro;

“ 2616 since the beginning of the era of Nabonassar, which has been assigned to Wednesday, the 26<sup>th</sup> of February, of the 3967<sup>th</sup> year of the Julian Period, corresponding according to the chronologists to the 747<sup>th</sup>, and according to the astronomers to the 746<sup>th</sup> year before the birth of Christ.

“ 2645 of the Olympiads, or the first year of the 662<sup>d</sup> Olympiad, commencing in July, 1869, if we fix the era of the Olympiads at 775½ years before Christ, or near the beginning of July of the year 3938 of the Julian Period;

“ 2181 of the Grecian era, or the era of the Seleucidæ;

“ 1585 of the era of Diocletian.

The year 1286 of the Mohammedan era, or the era of the Hegira, begins on the 13<sup>th</sup> of April, 1869.

The first day of January of the year 1869 is the 2,403,699<sup>th</sup> day since the commencement of the Julian Period.

## CHRONOLOGICAL CYCLES.

Dominical Letter . . . . .	C	Solar Cycle . . . . .	2
Epact . . . . .	17	Roman Indiction . . . . .	12
Lunar Cycle or Golden Number . . . . .	8	Julian Period . . . . .	6582

## SYMBOLS AND ABBREVIATIONS.

---

### SIGNS OF THE PLANETS, &c.

☉	The Sun.	♂	Mars.
☾	The Moon.	♃	Jupiter.
☿	Mercury.	♄	Saturn.
♀	Venus.	♅	Uranus.
⊕ or ♂	The Earth.	♆	Neptune.

### SIGNS OF THE ZODIAC.

Spring signs.	1.	♈	Aries.	Autumn signs.	7.	♎	Libra.
	2.	♉	Taurus.		8.	♏	Scorpio.
	3.	♊	Gemini.		9.	♐	Sagittarius.
Summer signs.	4.	♋	Cancer.	Winter signs.	10.	♑	Capricornus.
	5.	♌	Leo.		11.	♒	Aquarius.
	6.	♍	Virgo.		12.	♓	Pisces.

### ASPECTS.

♌	Conjunction, or having the same Longitude or Right Ascension.			
☐	Quadrature, or differing 90° in	"	"	"
♌	Opposition, or differing 180° in	"	"	"

### ABBREVIATIONS.

♈	Ascending Node.	'	Minutes of Arc.
♏	Descending Node.	"	Seconds of Arc.
N.	North.	h	Hours.
E.	East.	m	Minutes of Time.
°	Degrees.	s	Seconds of Time.

# ASTRONOMICAL EPHEMERIS

FOR THE USE OF

## NAVIGATORS.

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.			
Frid.	1	<sup>h</sup> 18 <sup>m</sup> 48 <sup>s</sup> 40.85	11.030	S.22° 58' 56.5	12.83	16' 18.41	71.07	<sup>m</sup> 3 <sup>s</sup> 58.30	1.174
Sat.	2	18 53 5.50	11.016	22 53 34.8	13.97	16 18.40	71.02	4 26.30	1.160
Sun.	3	18 57 29.80	11.001	22 47 45.7	15.10	16 18.39	70.97	4 53.97	1.145
Mon.	4	19 1 53.71	10.985	22 41 29.3	16.23	16 18.37	70.91	5 21.25	1.129
Tues.	5	19 6 17.22	10.968	22 34 46.0	17.35	16 18.34	70.85	5 48.12	1.112
Wed.	6	19 10 40.30	10.949	22 27 35.9	18.46	16 18.31	70.79	6 14.58	1.093
Thur.	7	19 15 2.92	10.929	22 19 59.2	19.56	16 18.28	70.72	6 40.57	1.073
Frid.	8	19 19 25.04	10.908	22 11 56.2	20.66	16 18.24	70.65	7 6.07	1.052
Sat.	9	19 23 46.65	10.886	22 3 27.0	21.74	16 18.19	70.58	7 31.06	1.030
Sun.	10	19 28 7.72	10.863	21 54 31.9	22.81	16 18.14	70.50	7 55.50	1.007
Mon.	11	19 32 28.20	10.838	21 45 11.3	23.87	16 18.09	70.42	8 19.36	0.982
Tues.	12	19 36 48.08	10.813	21 35 25.3	24.92	16 18.03	70.33	8 42.62	0.957
Wed.	13	19 41 7.34	10.786	21 25 14.3	25.96	16 17.97	70.25	9 5.26	0.930
Thur.	14	19 45 25.94	10.759	21 14 38.4	26.99	16 17.90	70.16	9 27.25	0.903
Frid.	15	19 49 43.88	10.730	21 3 38.1	28.00	16 17.83	70.07	9 48.57	0.874
Sat.	16	19 54 1.12	10.701	20 52 13.5	29.00	16 17.76	69.97	10 9.19	0.845
Sun.	17	19 58 17.64	10.671	20 40 25.2	29.99	16 17.68	69.87	10 29.11	0.815
Mon.	18	20 2 33.42	10.640	20 28 13.5	30.96	16 17.60	69.77	10 48.28	0.784
Tues.	19	20 6 48.44	10.608	20 15 38.8	31.92	16 17.52	69.67	11 6.70	0.752
Wed.	20	20 11 2.70	10.576	20 2 41.2	32.86	16 17.43	69.57	11 24.35	0.720
Thur.	21	20 15 16.17	10.543	19 49 21.0	33.79	16 17.34	69.47	11 41.22	0.687
Frid.	22	20 19 28.86	10.509	19 35 38.7	34.70	16 17.24	69.36	11 57.30	0.653
Sat.	23	20 23 40.74	10.476	19 21 34.9	35.59	16 17.14	69.25	12 12.59	0.620
Sun.	24	20 27 51.81	10.442	19 7 9.6	36.47	16 17.03	69.14	12 27.06	0.586
Mon.	25	20 32 2.06	10.408	18 52 23.4	37.34	16 16.91	69.03	12 40.72	0.552
Tues.	26	20 36 11.50	10.374	18 37 16.5	38.19	16 16.79	68.92	12 53.57	0.518
Wed.	27	20 40 20.13	10.340	18 21 49.5	39.03	16 16.66	68.81	13 5.61	0.484
Thur.	28	20 44 27.93	10.306	18 6 2.7	39.85	16 16.53	68.69	13 16.83	0.450
Frid.	29	20 48 34.91	10.272	17 49 56.4	40.65	16 16.39	68.58	13 27.23	0.416
Sat.	30	20 52 41.07	10.239	17 33 30.9	41.44	16 16.25	68.46	13 36.80	0.383
Sun.	31	20 56 46.42	10.205	17 16 46.8	42.21	16 16.10	68.35	13 45.57	0.349
Mon.	32	21 0 50.98	10.172	S.16 59 44.5	42.96	16 15.95	68.23	13 53.54	0.316

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.19 from the Sidereal Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be subtracted from Mean Time.	Diff. for 1 hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.			
Frid.	1	18 <sup>h</sup> 48 <sup>m</sup> 40.12	11.030	S. 22° 58' 57.3"	12.83	3 58.22	1.174	18 44 41.90
Sat.	2	18 53 4.68	11.016	22 53 35.8	13.97	4 26.22	1.160	18 48 38.46
Sun.	3	18 57 28.90	11.001	22 47 46.9	15.10	4 53.88	1.145	18 52 35.02
Mon.	4	19 1 52.73	10.985	22 41 30.8	16.23	5 21.15	1.129	18 56 31.58
Tues.	5	19 6 16.16	10.968	22 34 47.7	17.35	5 48.02	1.112	19 0 28.14
Wed.	6	19 10 39.16	10.949	22 27 37.8	18.46	6 14.47	1.093	19 4 24.69
Thur.	7	19 15 1.70	10.929	22 20 1.4	19.56	6 40.45	1.073	19 8 21.25
Frid.	8	19 19 23.75	10.908	22 11 58.6	20.66	7 5.94	1.052	19 12 17.81
Sat.	9	19 23 45.29	10.886	22 3 29.7	21.74	7 30.93	1.030	19 16 14.36
Sun.	10	19 28 6.29	10.863	21 54 35.0	22.81	7 55.37	1.007	19 20 10.92
Mon.	11	19 32 26.70	10.838	21 45 14.6	23.87	8 19.22	0.982	19 24 7.48
Tues.	12	19 36 46.51	10.813	21 35 28.9	24.92	8 42.48	0.957	19 28 4.03
Wed.	13	19 41 5.71	10.786	21 25 18.2	25.96	9 5.12	0.930	19 32 0.59
Thur.	14	19 45 24.25	10.759	21 14 42.6	26.99	9 27.11	0.903	19 35 57.14
Frid.	15	19 49 42.13	10.730	21 3 42.6	28.00	9 48.43	0.874	19 39 53.70
Sat.	16	19 53 59.31	10.701	20 52 18.4	29.00	10 9.05	0.845	19 43 50.26
Sun.	17	19 58 15.78	10.671	20 40 30.4	29.99	10 28.97	0.815	19 47 46.81
Mon.	18	20 2 31.51	10.640	20 28 19.1	30.96	10 48.14	0.784	19 51 43.37
Tues.	19	20 6 46.48	10.608	20 15 44.7	31.92	11 6.55	0.752	19 55 39.93
Wed.	20	20 11 0.69	10.576	20 2 47.4	32.86	11 24.21	0.720	19 59 36.48
Thur.	21	20 15 14.12	10.543	19 49 27.5	33.79	11 41.08	0.687	20 3 33.04
Frid.	22	20 19 26.77	10.509	19 35 45.6	34.70	11 57.17	0.653	20 7 29.60
Sat.	23	20 23 38.61	10.476	19 21 42.1	35.59	12 12.46	0.620	20 11 26.15
Sun.	24	20 27 49.64	10.442	19 7 17.2	36.47	12 26.93	0.586	20 15 22.71
Mon.	25	20 31 59.86	10.408	18 52 31.3	37.34	12 40.60	0.552	20 19 19.26
Tues.	26	20 36 9.27	10.374	18 37 24.7	38.19	12 53.45	0.518	20 23 15.82
Wed.	27	20 40 17.87	10.340	18 21 58.1	39.03	13 5.50	0.484	20 27 12.37
Thur.	28	20 44 25.65	10.306	18 6 11.6	39.85	13 16.72	0.450	20 31 8.93
Frid.	29	20 48 32.61	10.272	17 50 5.5	40.65	13 27.13	0.416	20 35 5.48
Sat.	30	20 52 38.75	10.239	17 33 40.3	41.44	13 36.71	0.383	20 39 2.04
Sun.	31	20 56 44.08	10.205	17 16 56.5	42.21	13 45.49	0.349	20 42 58.59
Mon.	32	21 0 48.62	10.172	S. 16 59 54.5	42.96	13 53.47	0.316	20 46 55.15

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 h.  
+9".8565

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	1	281° 11' 38.6	11' 49.7	152.85	—0.04	9.9926520	1.2	5 <sup>h</sup> 14 <sup>m</sup> 26.45 <sup>s</sup>
2	2	282 12 47.4	12 58.4	152.87	+0.10	.9926562	2.3	5 10 30.54
3	3	283 13 56.4	14 7.2	152.88	0.21	.9926632	3.4	5 6 34.62
4	4	284 15 5.6	15 16.2	152.89	0.30	.9926727	4.4	5 2 38.71
5	5	285 16 14.9	16 25.3	152.89	0.39	.9926846	5.4	4 58 42.79
6	6	286 17 24.3	17 34.6	152.89	0.45	.9926987	6.3	4 54 46.88
7	7	287 18 33.7	18 43.9	152.89	0.48	.9927150	7.2	4 50 50.97
8	8	288 19 43.2	19 53.2	152.90	0.48	.9927333	8.0	4 46 55.06
9	9	289 20 52.7	21 2.5	152.89	0.45	.9927535	8.8	4 42 59.15
10	10	290 22 2.1	22 11.7	152.89	0.38	.9927755	9.5	4 39 3.24
11	11	291 23 11.3	23 20.8	152.88	0.29	.9927993	10.2	4 35 7.33
12	12	292 24 20.1	24 29.5	152.86	0.19	.9928247	10.9	4 31 11.42
13	13	293 25 28.5	25 37.7	152.84	+0.07	.9928518	11.6	4 27 15.51
14	14	294 26 36.4	26 45.4	152.82	—0.06	.9928804	12.2	4 23 19.60
15	15	295 27 43.7	27 52.6	152.79	0.20	.9929105	12.9	4 19 23.69
16	16	296 28 50.4	28 59.1	152.76	0.33	.9929424	13.6	4 15 27.78
17	17	297 29 56.3	30 4.8	152.73	0.45	.9929760	14.3	4 11 31.87
18	18	298 31 1.3	31 9.7	152.69	0.55	.9930113	15.1	4 7 35.95
19	19	299 32 5.4	32 13.6	152.65	0.64	.9930485	15.9	4 3 40.04
20	20	300 33 8.4	33 16.4	152.61	0.70	.9930877	16.8	3 59 44.13
21	21	301 34 10.4	34 18.3	152.57	0.72	.9931291	17.7	3 55 48.23
22	22	302 35 11.4	35 19.2	152.52	0.71	.9931728	18.7	3 51 52.32
23	23	303 36 11.2	36 15.9	152.48	0.67	.9932189	19.7	3 47 56.41
24	24	304 37 10.0	37 17.5	152.43	0.61	.9932674	20.7	3 44 0.51
25	25	305 38 7.8	38 15.1	152.39	0.52	.9933183	21.8	3 40 4.59
26	26	306 39 4.6	39 11.7	152.34	0.42	.9933719	22.9	3 36 8.68
27	27	307 40 0.3	40 7.2	152.30	0.30	.9934280	24.0	3 32 12.77
28	28	308 40 55.0	41 1.8	152.26	0.17	.9934867	25.1	3 28 16.86
29	29	309 41 48.8	41 55.5	152.22	—0.03	.9935480	26.1	3 24 20.95
30	30	310 42 41.6	42 48.2	152.18	+0.10	.9936118	27.1	3 20 25.04
31	31	311 43 33.5	43 39.9	152.14	0.21	.9936781	28.1	3 16 29.13
32	32	312 44 24.5	44 30.8	152.11	+0.31	9.9937467	29.0	3 12 33.22
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>s</sup> .830

GREENWICH MEAN TIME.										
Day of the Month.	THE MOON'S									
	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.	
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.		
1	16' 28.0	16' 26.2	60' 19.6	−0.42	60' 12.9	−0.67	15 24.8	m 2.33	d 18.4	
2	16 23.7	16 20.3	60 3.4	0.90	59 51.4	1.08	16 19.3	2.29	19.4	
3	16 16.5	16 12.3	59 37.3	1.23	59 21.7	1.35	17 11.5	2.14	20.4	
4	16 7.7	16 3.0	59 5.0	1.42	58 47.7	1.46	18 1.9	2.08	21.4	
5	15 58.2	15 53.4	58 30.1	1.47	58 12.4	1.47	18 51.5	2.06	22.4	
6	15 48.6	15 43.8	57 54.8	1.46	57 37.3	1.44	19 40.9	2.07	23.4	
7	15 39.2	15 34.6	57 20.1	1.42	57 3.2	1.39	20 30.7	2.09	24.4	
8	15 30.1	15 25.7	56 46.8	1.35	56 30.8	1.30	21 21.1	2.11	25.4	
9	15 21.5	15 17.5	56 15.5	1.26	56 0.7	1.21	22 12.0	2.12	26.4	
10	15 13.6	15 10.0	55 46.5	1.15	55 33.0	1.09	23 3.0	2.11	27.4	
11	15 6.5	15 3.2	55 20.3	1.04	55 8.1	0.98	23 53.3	2.07	28.4	
12	15 0.1	14 57.2	54 56.7	0.92	54 46.0	0.85	6		29.4	
13	14 54.5	14 52.1	54 36.1	0.78	54 27.3	0.69	0 42.4	2.01	0.7	
14	14 50.0	14 48.2	54 19.6	0.59	54 13.1	0.48	1 29.8	1.94	1.7	
15	14 46.8	14 45.9	54 8.0	0.36	54 4.4	−0.22	2 15.3	1.86	2.7	
16	14 45.4	14 45.4	54 2.6	−0.07	54 2.6	+0.09	2 59.2	1.80	3.7	
17	14 45.9	14 47.1	54 4.6	+0.26	54 8.8	0.44	3 41.9	1.76	4.7	
18	14 48.8	14 51.2	54 15.2	0.63	54 24.1	0.83	4 24.0	1.75	5.7	
19	14 54.3	14 58.0	54 35.3	1.04	54 49.0	1.24	5 6.2	1.78	6.7	
20	15 2.4	15 7.5	55 5.1	1.45	55 23.7	1.64	5 49.4	1.84	7.7	
21	15 13.2	15 19.5	55 44.6	1.83	56 7.7	2.01	6 34.5	1.93	8.7	
22	15 26.3	15 33.5	56 32.8	2.15	56 59.4	2.27	7 22.3	2.06	9.7	
23	15 41.1	15 49.0	57 27.4	2.36	57 56.2	2.41	8 13.6	2.21	10.7	
24	15 56.9	16 4.7	58 25.2	2.40	58 53.9	2.34	9 8.6	2.36	11.7	
25	16 12.2	16 19.2	59 21.5	2.23	59 47.4	2.05	10 7.0	2.48	12.7	
26	16 25.6	16 31.1	60 10.7	1.81	60 30.8	1.52	11 7.7	2.54	13.7	
27	16 35.6	16 38.9	60 47.3	1.20	60 59.5	0.83	12 9.0	2.53	14.7	
28	16 41.0	16 41.7	61 7.2	+0.44	61 10.0	+0.04	13 9.2	2.46	15.7	
29	16 41.2	16 39.5	61 8.1	−0.35	61 1.6	−0.72	14 7.1	2.36	16.7	
30	16 36.5	16 32.6	60 50.8	1.06	60 36.2	1.35	15 2.6	2.26	17.7	
31	16 27.7	16 22.1	60 18.3	1.60	59 57.8	1.80	15 55.7	2.18	18.7	
32	16 15.9	16 9.4	59 35.2	−1.94	59 11.3	−2.03	16 47.2	2.13	19.7	

## GREENWICH MEAN TIME

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 1.					SUNDAY 3.				
0	9 34 30.20	2.4684	N. 14° 48' 20.7"	8.592	0	11 28 14.41	2.2756	N. 6° 31' 13.0"	11.588
1	9 36 58.19	2.4644	14 39 42.4	8.686	1	11 30 30.84	2.2722	6 19 36.9	11.616
2	9 39 25.93	2.4603	14 30 58.4	8.780	2	11 32 47.07	2.2688	6 7 50.1	11.644
3	9 41 53.43	2.4562	14 22 8.8	8.872	3	11 35 3.10	2.2655	5 56 19.7	11.670
4	9 44 20.68	2.4521	14 13 13.7	8.963	4	11 37 18.93	2.2621	5 44 38.7	11.695
5	9 46 47.68	2.4480	14 4 13.2	9.053	5	11 39 34.56	2.2589	5 32 56.3	11.719
6	9 49 14.43	2.4438	13 55 7.3	9.142	6	11 41 50.00	2.2557	5 21 12.5	11.741
7	9 51 40.94	2.4397	13 45 56.2	9.229	7	11 44 5.24	2.2525	5 9 27.4	11.762
8	9 54 7.20	2.4355	13 36 39.9	9.314	8	11 46 20.30	2.2494	4 57 41.0	11.782
9	9 56 33.20	2.4313	13 27 18.5	9.398	9	11 48 35.17	2.2463	4 45 53.5	11.801
10	9 58 58.95	2.4271	13 17 52.1	9.481	10	11 50 49.86	2.2433	4 34 4.9	11.818
11	10 1 24.45	2.4229	13 8 20.8	9.563	11	11 53 4.36	2.2403	4 22 15.3	11.834
12	10 3 49.70	2.4187	12 58 44.7	9.642	12	11 55 18.69	2.2374	4 10 24.8	11.849
13	10 6 14.69	2.4144	12 49 3.8	9.720	13	11 57 32.85	2.2345	3 58 33.4	11.863
14	10 8 39.43	2.4102	12 39 18.3	9.797	14	11 59 46.83	2.2316	3 46 41.3	11.875
15	10 11 3.92	2.4060	12 29 28.2	9.873	15	12 2 0.64	2.2288	3 34 48.4	11.886
16	10 13 28.15	2.4018	12 19 33.6	9.947	16	12 4 14.29	2.2261	3 22 54.9	11.896
17	10 15 52.13	2.3975	12 9 34.6	10.020	17	12 6 27.77	2.2234	3 11 0.9	11.905
18	10 18 15.86	2.3933	11 59 31.2	10.092	18	12 8 41.10	2.2207	2 59 6.3	11.913
19	10 20 39.33	2.3891	11 49 23.6	10.162	19	12 10 54.26	2.2181	2 47 11.3	11.919
20	10 23 2.55	2.3849	11 39 11.8	10.231	20	12 13 7.28	2.2156	2 35 16.0	11.924
21	10 25 25.52	2.3807	11 28 55.9	10.298	21	12 15 20.14	2.2131	2 23 20.4	11.929
22	10 27 48.24	2.3765	11 18 36.0	10.364	22	12 17 32.85	2.2106	2 11 24.6	11.932
23	10 30 10.71	2.3723	N. 11° 8' 12.3"	10.428	23	12 19 45.42	2.2082	N. 1° 59' 28.6"	11.934
SATURDAY 2.					MONDAY 4.				
0	10 32 32.93	2.3682	N. 10° 57' 44.7"	10.491	0	12 21 57.84	2.2059	N. 1° 47' 32.6"	11.934
1	10 34 54.90	2.3641	10 47 13.4	10.552	1	12 24 10.13	2.2037	1 35 36.6	11.933
2	10 37 16.62	2.3599	10 36 38.4	10.613	2	12 26 22.28	2.2014	1 23 40.6	11.931
3	10 39 38.09	2.3558	10 25 59.9	10.672	3	12 28 34.30	2.1992	1 11 44.8	11.928
4	10 41 59.31	2.3517	10 15 17.9	10.729	4	12 30 46.19	2.1971	0 59 49.2	11.924
5	10 44 20.29	2.3476	10 4 32.5	10.785	5	12 32 57.95	2.1950	0 47 53.9	11.919
6	10 46 41.03	2.3436	9 53 43.7	10.840	6	12 35 9.59	2.1930	0 35 58.9	11.913
7	10 49 1.52	2.3395	9 42 51.7	10.893	7	12 37 21.11	2.1910	0 24 4.3	11.906
8	10 51 21.77	2.3355	9 31 56.5	10.945	8	12 39 32.51	2.1891	0 12 10.2	11.897
9	10 53 41.78	2.3315	9 20 58.3	10.996	9	12 41 43.80	2.1872	N. 0° 0' 16.6"	11.888
10	10 56 1.55	2.3276	9 9 57.1	11.045	10	12 43 54.98	2.1854	S. 0° 11' 36.4"	11.877
11	10 58 21.09	2.3237	8 58 53.0	11.092	11	12 46 6.05	2.1836	0 23 28.7	11.866
12	11 0 40.39	2.3198	8 47 46.0	11.138	12	12 48 17.01	2.1819	0 35 20.3	11.853
13	11 2 59.46	2.3159	8 36 36.4	11.183	13	12 50 27.87	2.1803	0 47 11.1	11.839
14	11 5 18.30	2.3120	8 25 24.1	11.226	14	12 52 38.64	2.1786	0 59 1.0	11.824
15	11 7 36.91	2.3082	8 14 9.2	11.269	15	12 54 49.31	2.1771	1 10 50.0	11.808
16	11 9 55.29	2.3045	8 2 51.8	11.310	16	12 56 59.89	2.1755	1 22 38.0	11.791
17	11 12 13.44	2.3007	7 51 32.1	11.349	17	12 59 10.38	2.1741	1 34 24.9	11.773
18	11 14 31.38	2.2970	7 40 10.0	11.387	18	13 1 20.78	2.1727	1 46 10.8	11.755
19	11 16 49.09	2.2934	7 28 45.7	11.424	19	13 3 31.10	2.1713	1 57 55.5	11.735
20	11 19 6.58	2.2897	7 17 19.2	11.460	20	13 5 41.34	2.1700	2 9 39.0	11.714
21	11 21 23.86	2.2861	7 5 50.6	11.494	21	13 7 51.50	2.1688	2 21 21.2	11.692
22	11 23 40.92	2.2826	6 54 20.0	11.526	22	13 10 1.59	2.1676	2 33 2.0	11.669
23	11 25 57.77	2.2791	6 42 47.4	11.558	23	13 12 11.61	2.1664	2 44 41.4	11.645
24	11 28 14.41	2.2756	N. 6° 31' 13.0"	11.588	24	13 14 21.56	2.1653	S. 2° 56' 19.3"	11.620



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 5.					THURSDAY 7.				
0	13 14 21.56	2.1653	S. 2° 56' 19.3"	11.620	0	14 57 52.71	2.1638	S. 11° 27' 46.2"	9.382
1	13 16 31.45	2.1643	3 7 55.7	11.594	1	15 0 2.50	2.1636	11 37 5.9	9.296
2	13 18 41.27	2.1633	3 19 30.5	11.567	2	15 2 12.34	2.1644	11 46 21.6	9.228
3	13 20 51.04	2.1623	3 31 3.7	11.539	3	15 4 22.23	2.1652	11 55 33.2	9.159
4	13 23 0.75	2.1614	3 42 35.2	11.510	4	15 6 32.17	2.1660	12 4 40.7	9.090
5	13 25 10.40	2.1605	3 54 4.9	11.480	5	15 8 42.16	2.1669	12 13 44.0	9.020
6	13 27 20.01	2.1597	4 5 32.8	11.449	6	15 10 52.20	2.1678	12 22 43.1	8.950
7	13 29 29.57	2.1589	4 16 58.8	11.417	7	15 13 2.29	2.1686	12 31 38.0	8.879
8	13 31 39.08	2.1580	4 28 22.8	11.384	8	15 15 12.43	2.1695	12 40 28.6	8.807
9	13 33 48.55	2.1575	4 39 44.9	11.351	9	15 17 22.63	2.1704	12 49 14.8	8.734
10	13 35 57.99	2.1570	4 51 4.9	11.316	10	15 19 32.88	2.1713	12 57 56.6	8.661
11	13 38 7.39	2.1564	5 2 22.8	11.280	11	15 21 43.19	2.1723	13 6 34.0	8.587
12	13 40 16.76	2.1558	5 13 38.5	11.244	12	15 23 53.56	2.1733	13 15 7.0	8.512
13	13 42 26.09	2.1553	5 24 52.1	11.207	13	15 26 3.98	2.1742	13 23 35.5	8.436
14	13 44 35.40	2.1549	5 36 3.4	11.169	14	15 28 14.46	2.1752	13 31 59.4	8.360
15	13 46 44.68	2.1545	5 47 12.3	11.130	15	15 30 25.00	2.1762	13 40 18.7	8.284
16	13 48 53.94	2.1542	5 58 18.9	11.089	16	15 32 35.60	2.1771	13 48 33.4	8.207
17	13 51 3.18	2.1539	6 9 23.0	11.048	17	15 34 46.26	2.1781	13 56 43.5	8.129
18	13 53 12.40	2.1536	6 20 24.7	11.006	18	15 36 56.98	2.1791	14 4 48.9	8.050
19	13 55 21.61	2.1534	6 31 23.8	10.964	19	15 39 7.76	2.1801	14 12 49.5	7.971
20	13 57 30.81	2.1532	6 42 20.3	10.920	20	15 41 18.60	2.1811	14 20 45.4	7.891
21	13 59 40.00	2.1530	6 53 14.2	10.875	21	15 43 29.50	2.1822	14 28 36.4	7.810
22	14 1 49.18	2.1529	7 4 5.4	10.830	22	15 45 40.46	2.1832	14 36 22.6	7.729
23	14 3 58.35	2.1529	S. 7 14 53.8	10.784	23	15 47 51.48	2.1842	S. 14 44 3.9	7.647
WEDNESDAY 6.					FRIDAY 8.				
0	14 6 7.53	2.1529	S. 7 25 39.4	10.737	0	15 50 2.56	2.1853	S. 14 51 40.3	7.565
1	14 8 16.70	2.1529	7 36 22.2	10.689	1	15 52 13.71	2.1863	14 59 11.7	7.483
2	14 10 25.88	2.1530	7 47 2.1	10.640	2	15 54 24.92	2.1873	15 6 38.2	7.399
3	14 12 35.06	2.1531	7 57 39.1	10.591	3	15 56 36.19	2.1884	15 13 59.6	7.315
4	14 14 44.25	2.1532	8 8 13.0	10.540	4	15 58 47.52	2.1894	15 21 16.0	7.230
5	14 16 53.45	2.1534	8 18 43.9	10.489	5	16 0 58.91	2.1904	15 28 27.4	7.145
6	14 19 2.66	2.1536	8 29 11.7	10.437	6	16 3 10.36	2.1914	15 35 33.5	7.059
7	14 21 11.88	2.1539	8 39 36.3	10.384	7	16 5 21.88	2.1924	15 42 34.5	6.973
8	14 23 21.12	2.1542	8 49 57.8	10.330	8	16 7 33.45	2.1934	15 49 30.2	6.886
9	14 25 30.38	2.1545	9 0 16.0	10.276	9	16 9 45.09	2.1944	15 56 20.7	6.798
10	14 27 39.66	2.1548	9 10 30.9	10.220	10	16 11 56.78	2.1954	16 3 6.0	6.710
11	14 29 48.96	2.1552	9 20 42.5	10.164	11	16 14 8.53	2.1964	16 9 46.0	6.622
12	14 31 58.29	2.1556	9 30 50.6	10.107	12	16 16 20.34	2.1973	16 16 20.6	6.533
13	14 34 7.64	2.1561	9 40 55.3	10.049	13	16 18 32.21	2.1983	16 22 49.9	6.444
14	14 36 17.02	2.1566	9 50 56.5	9.990	14	16 20 44.13	2.1992	16 29 13.9	6.354
15	14 38 26.43	2.1571	10 0 54.2	9.931	15	16 22 56.11	2.2001	16 35 32.4	6.263
16	14 40 35.87	2.1576	10 10 48.3	9.871	16	16 25 8.15	2.2011	16 41 45.5	6.172
17	14 42 45.34	2.1582	10 20 38.7	9.810	17	16 27 20.24	2.2020	16 47 53.1	6.081
18	14 44 54.85	2.1588	10 30 25.5	9.748	18	16 29 32.38	2.2029	16 53 55.2	5.989
19	14 47 4.39	2.1594	10 40 8.5	9.686	19	16 31 44.58	2.2037	16 59 51.8	5.897
20	14 49 13.97	2.1600	10 49 47.8	9.623	20	16 33 56.83	2.2046	17 5 42.8	5.804
21	14 51 23.59	2.1607	10 59 23.2	9.559	21	16 36 9.13	2.2054	17 11 28.2	5.711
22	14 53 33.25	2.1614	11 8 54.8	9.494	22	16 38 21.48	2.2062	17 17 8.1	5.617
23	14 55 42.95	2.1621	11 18 22.5	9.428	23	16 40 33.88	2.2070	17 22 42.3	5.523
24	14 57 52.71	2.1628	S. 11 27 46.2	9.362	24	16 42 46.32	2.2078	S. 17 28 10.9	5.429

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 9.					MONDAY 11.				
0	16 42 46.32	2.9078	S. 17° 26' 10.9"	5.429	0	18 29 3.49	2.9063	S. 19° 54' 24.8"	0.804
1	16 44 58.81	2.9085	17 33 33.8	5.334	1	18 31 15.84	2.9053	19 54 58.0	0.502
2	16 47 11.34	2.9092	17 38 51.0	5.238	2	18 33 28.13	2.9042	19 55 25.1	0.400
3	16 49 23.92	2.9099	17 44 2.4	5.142	3	18 35 40.35	2.9031	19 55 46.0	0.298
4	16 51 36.54	2.9106	17 49 8.1	5.046	4	18 37 52.50	2.9020	19 56 0.8	0.197
5	16 53 49.20	2.9113	17 54 8.0	4.950	5	18 40 4.58	2.9008	19 56 9.6	0.095
6	16 56 1.90	2.9119	17 59 2.1	4.853	6	18 42 16.59	2.1995	19 56 12.3	0.006
7	16 58 14.63	2.9125	18 3 50.4	4.756	7	18 44 28.53	2.1982	19 56 8.9	0.107
8	17 0 27.40	2.9131	18 8 32.8	4.659	8	18 46 40.39	2.1969	19 55 59.4	0.208
9	17 2 40.20	2.9137	18 13 9.4	4.561	9	18 48 52.16	2.1956	19 55 43.9	0.309
10	17 4 53.04	2.9143	18 17 40.1	4.463	10	18 51 3.85	2.1942	19 55 22.3	0.410
11	17 7 5.91	2.9147	18 22 4.9	4.364	11	18 53 15.46	2.1927	19 54 54.7	0.510
12	17 9 18.80	2.9151	18 26 23.8	4.265	12	18 55 26.98	2.1912	19 54 21.0	0.610
13	17 11 31.72	2.9155	18 30 36.7	4.166	13	18 57 38.40	2.1896	19 53 41.4	0.710
14	17 13 44.66	2.9159	18 34 43.7	4.067	14	18 59 49.73	2.1880	19 52 55.8	0.810
15	17 15 57.63	2.9163	18 38 44.7	3.967	15	19 2 0.96	2.1864	19 52 4.2	0.909
16	17 18 10.62	2.9166	18 42 39.8	3.868	16	19 4 12.10	2.1847	19 51 6.7	1.008
17	17 20 23.62	2.9169	18 46 28.8	3.768	17	19 6 23.13	2.1830	19 50 3.2	1.107
18	17 22 36.64	2.9172	18 50 11.9	3.668	18	19 8 34.06	2.1813	19 48 53.8	1.206
19	17 24 49.68	2.9174	18 53 49.0	3.567	19	19 10 44.89	2.1795	19 47 38.5	1.304
20	17 27 2.73	2.9176	18 57 20.0	3.467	20	19 12 55.61	2.1777	19 46 17.3	1.402
21	17 29 15.79	2.9177	19 0 45.0	3.366	21	19 15 6.22	2.1758	19 44 50.2	1.500
22	17 31 28.86	2.9178	19 4 3.9	3.265	22	19 17 16.71	2.1739	19 43 17.3	1.597
23	17 33 41.93	2.9179	S. 19 7 16.8	3.163	23	19 19 27.09	2.1720	S. 19 41 38.5	1.694
SUNDAY 10.					TUESDAY 12.				
0	17 35 55.01	2.9179	S. 19 10 23.6	3.062	0	19 21 37.35	2.1700	S. 19 39 53.9	1.791
1	17 38 8.09	2.9179	19 13 24.3	2.960	1	19 23 47.49	2.1679	19 38 3.6	1.887
2	17 40 21.16	2.9179	19 16 18.8	2.858	2	19 25 57.50	2.1659	19 36 7.5	1.983
3	17 42 34.23	2.9178	19 19 7.3	2.756	3	19 28 7.39	2.1638	19 34 5.6	2.079
4	17 44 47.30	2.9177	19 21 49.6	2.654	4	19 30 17.15	2.1617	19 31 58.0	2.174
5	17 47 0.35	2.9175	19 24 25.8	2.552	5	19 32 26.79	2.1595	19 29 44.7	2.269
6	17 49 13.39	2.9173	19 26 55.9	2.450	6	19 34 36.30	2.1573	19 27 25.7	2.363
7	17 51 26.42	2.9170	19 29 19.8	2.348	7	19 36 45.67	2.1551	19 25 1.1	2.456
8	17 53 39.44	2.9168	19 31 37.6	2.245	8	19 38 54.91	2.1528	19 22 30.9	2.550
9	17 55 52.44	2.9165	19 33 49.2	2.143	9	19 41 4.01	2.1505	19 19 55.1	2.644
10	17 58 5.42	2.9161	19 35 54.7	2.040	10	19 43 12.98	2.1482	19 17 13.7	2.737
11	18 0 18.38	2.9157	19 37 54.0	1.938	11	19 45 21.80	2.1459	19 14 26.7	2.829
12	18 2 31.32	2.9152	19 39 47.2	1.835	12	19 47 30.48	2.1435	19 11 34.2	2.921
13	18 4 44.22	2.9147	19 41 34.2	1.732	13	19 49 39.02	2.1411	19 8 36.2	3.012
14	18 6 57.09	2.9142	19 43 15.0	1.629	14	19 51 47.41	2.1386	19 5 32.7	3.103
15	18 9 9.92	2.9136	19 44 49.7	1.526	15	19 53 55.65	2.1361	19 2 23.8	3.194
16	18 11 22.72	2.9130	19 46 18.2	1.424	16	19 56 3.74	2.1336	18 59 9.5	3.284
17	18 13 35.48	2.9123	19 47 40.6	1.321	17	19 58 11.69	2.1311	18 55 49.8	3.373
18	18 15 48.19	2.9116	19 48 56.8	1.218	18	20 0 19.48	2.1286	18 52 24.7	3.462
19	18 18 0.86	2.9108	19 50 6.8	1.116	19	20 2 27.12	2.1260	18 48 54.3	3.551
20	18 20 13.49	2.9100	19 51 10.7	1.013	20	20 4 34.60	2.1234	18 45 18.6	3.639
21	18 22 26.07	2.9092	19 52 8.4	0.911	21	20 6 41.92	2.1208	18 41 37.7	3.726
22	18 24 38.60	2.9083	19 53 0.0	0.808	22	20 8 49.09	2.1182	18 37 51.5	3.813
23	18 26 51.07	2.9073	19 53 45.5	0.706	23	20 10 56.10	2.1155	18 34 0.1	3.900
24	18 29 3.49	2.9063	S. 19 54 24.8	0.604	24	20 13 2.95	2.1128	S. 18 30 3.6	3.966

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 13.					FRIDAY 15.				
0	<sup>n</sup> 20 <sup>m</sup> 13 <sup>s</sup> 2.95	2.1198	S. 18° 30' 3.6"	3.988	0	<sup>h</sup> 21 <sup>m</sup> 51 <sup>s</sup> 10.23	1.9755	S. 13° 50' 35.8"	7.496
1	20 15 9.64	2.1101	18 26 1.9	4.071	1	21 53 8.68	1.9798	13 43 8.5	7.483
2	20 17 16.16	2.1074	18 21 55.1	4.156	2	21 55 6.97	1.9702	13 35 37.8	7.539
3	20 19 22.52	2.1046	18 17 43.2	4.240	3	21 57 5.10	1.9675	13 28 3.8	7.594
4	20 21 28.72	2.1018	18 13 26.3	4.324	4	21 59 3.07	1.9649	13 20 26.5	7.649
5	20 23 34.75	2.0991	18 9 4.3	4.407	5	22 1 0.89	1.9623	13 12 46.0	7.703
6	20 25 40.61	2.0963	18 4 37.4	4.490	6	22 2 58.55	1.9597	13 5 2.2	7.756
7	20 27 46.30	2.0935	18 0 5.5	4.573	7	22 4 56.05	1.9571	12 57 15.2	7.809
8	20 29 51.82	2.0906	17 55 28.7	4.654	8	22 6 53.40	1.9546	12 49 25.1	7.861
9	20 31 57.18	2.0878	17 50 47.0	4.735	9	22 8 50.60	1.9520	12 41 31.9	7.913
10	20 34 2.36	2.0850	17 46 0.5	4.815	10	22 10 47.65	1.9495	12 33 35.6	7.964
11	20 36 7.37	2.0821	17 41 9.2	4.896	11	22 12 44.55	1.9471	12 25 36.3	8.014
12	20 38 12.21	2.0792	17 36 13.1	4.974	12	22 14 41.30	1.9446	12 17 33.9	8.064
13	20 40 16.87	2.0763	17 31 12.3	5.053	13	22 16 37.90	1.9422	12 9 28.5	8.114
14	20 42 21.36	2.0734	17 26 6.7	5.131	14	22 18 34.36	1.9398	12 1 20.2	8.162
15	20 44 25.68	2.0705	17 20 56.5	5.209	15	22 20 30.68	1.9374	11 53 9.0	8.210
16	20 46 29.82	2.0676	17 15 41.6	5.286	16	22 22 26.86	1.9351	11 44 55.0	8.257
17	20 48 33.80	2.0647	17 10 22.1	5.362	17	22 24 22.89	1.9328	11 36 38.2	8.304
18	20 50 37.59	2.0618	17 4 58.1	5.438	18	22 26 18.79	1.9305	11 28 18.5	8.350
19	20 52 41.22	2.0589	16 59 29.5	5.514	19	22 28 14.55	1.9283	11 19 56.1	8.396
20	20 54 44.66	2.0559	16 53 56.4	5.588	20	22 30 10.18	1.9261	11 11 31.0	8.441
21	20 56 47.92	2.0530	16 48 18.9	5.662	21	22 32 5.68	1.9238	11 3 3.2	8.485
22	20 58 51.02	2.0500	16 42 37.0	5.736	22	22 34 1.05	1.9217	10 54 32.8	8.529
23	21 0 53.94	2.0471	S. 16° 36' 50.7"	5.809	23	22 35 56.29	1.9196	S. 10° 45' 59.8"	8.572
THURSDAY 14.					SATURDAY 16.				
0	21 2 56.68	2.0442	S. 16° 31' 0.0"	5.881	0	22 37 51.40	1.9175	S. 10° 37' 24.2"	8.614
1	21 4 59.25	2.0413	16 25 5.0	5.959	1	22 39 46.39	1.9154	10 28 46.1	8.656
2	21 7 1.64	2.0383	16 19 5.7	6.023	2	22 41 41.26	1.9134	10 20 5.5	8.697
3	21 9 3.85	2.0354	16 13 2.2	6.093	3	22 43 36.00	1.9114	10 11 22.4	8.738
4	21 11 5.89	2.0324	16 6 54.5	6.163	4	22 45 30.62	1.9094	10 2 36.9	8.778
5	21 13 7.75	2.0295	16 0 42.7	6.232	5	22 47 25.13	1.9075	9 53 49.0	8.818
6	21 15 9.43	2.0266	15 54 26.7	6.301	6	22 49 19.53	1.9056	9 44 58.7	8.857
7	21 17 10.94	2.0237	15 48 6.6	6.368	7	22 51 13.81	1.9038	9 36 6.1	8.896
8	21 19 12.27	2.0208	15 41 42.5	6.435	8	22 53 7.98	1.9020	9 27 11.2	8.933
9	21 21 13.43	2.0179	15 35 14.4	6.502	9	22 55 2.05	1.9002	9 18 14.1	8.971
10	21 23 14.41	2.0150	15 28 42.3	6.568	10	22 56 56.01	1.8985	9 9 14.7	9.008
11	21 25 15.22	2.0121	15 22 6.2	6.634	11	22 58 49.87	1.8968	9 0 13.2	9.044
12	21 27 15.85	2.0092	15 15 26.2	6.699	12	23 0 43.62	1.8951	8 51 9.5	9.078
13	21 29 16.32	2.0063	15 8 42.4	6.763	13	23 2 37.28	1.8935	8 42 3.7	9.113
14	21 31 16.61	2.0034	15 1 54.7	6.826	14	23 4 30.84	1.8919	8 32 55.9	9.148
15	21 33 16.73	2.0006	14 55 3.2	6.889	15	23 6 24.31	1.8904	8 23 46.0	9.182
16	21 35 16.68	1.9978	14 48 8.0	6.951	16	23 8 17.69	1.8889	8 14 34.1	9.215
17	21 37 16.46	1.9949	14 41 9.1	7.012	17	23 10 10.97	1.8874	8 5 20.2	9.248
18	21 39 16.07	1.9921	14 34 6.5	7.073	18	23 12 4.17	1.8860	7 56 4.4	9.280
19	21 41 15.51	1.9893	14 27 0.3	7.134	19	23 13 57.28	1.8846	7 46 46.7	9.311
20	21 43 14.79	1.9865	14 19 50.5	7.194	20	23 15 50.32	1.8833	7 37 27.1	9.342
21	21 45 13.90	1.9837	14 12 37.1	7.253	21	23 17 43.28	1.8820	7 28 5.6	9.373
22	21 47 12.84	1.9810	14 5 20.1	7.311	22	23 19 36.16	1.8807	7 18 42.3	9.403
23	21 49 11.62	1.9783	13 57 59.7	7.369	23	23 21 28.97	1.8795	7 9 17.3	9.432
24	21 51 10.23	1.9755	S. 13° 50' 35.8"	7.426	24	23 23 21.71	1.8784	S. 6° 59' 50.5"	9.461

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 17.					TUESDAY 19.				
0	<sup>h</sup> 23 <sup>m</sup> 23 <sup>s</sup> 21.71	1.8784	S. 6° 59' 50.5"	9.461	0	<sup>h</sup> 0 53 <sup>m</sup> 4.79	1.8795	N. 0° 56' 55.5"	10.195
1	23 25 14.38	1.8773	6 50 22.0	9.489	1	0 54 57.59	1.8808	1 7 7.3	10.198
2	23 27 6.98	1.8762	6 40 51.8	9.516	2	0 56 50.48	1.8821	1 17 19.2	10.199
3	23 28 59.52	1.8751	6 31 20.0	9.543	3	0 58 43.45	1.8835	1 27 31.1	10.199
4	23 30 51.99	1.8741	6 21 46.6	9.570	4	1 0 36.50	1.8850	1 37 43.1	10.199
5	23 32 44.41	1.8732	6 12 11.6	9.596	5	1 2 29.65	1.8866	1 47 55.0	10.198
6	23 34 36.77	1.8723	6 2 35.1	9.621	6	1 4 22.89	1.8882	1 58 6.9	10.197
7	23 36 29.08	1.8714	5 52 57.1	9.646	7	1 6 16.23	1.8898	2 8 18.7	10.196
8	23 38 21.34	1.8706	5 43 17.6	9.670	8	1 8 9.67	1.8915	2 18 30.4	10.193
9	23 40 13.56	1.8699	5 33 36.7	9.694	9	1 10 3.21	1.8933	2 28 41.9	10.190
10	23 42 5.73	1.8692	5 23 54.4	9.717	10	1 11 56.86	1.8951	2 38 53.2	10.187
11	23 43 57.86	1.8685	5 14 10.7	9.740	11	1 13 50.62	1.8970	2 49 4.3	10.183
12	23 45 49.95	1.8679	5 4 25.6	9.762	12	1 15 44.50	1.8989	2 59 15.2	10.178
13	23 47 42.00	1.8673	4 54 39.2	9.784	13	1 17 38.49	1.9009	3 9 25.8	10.173
14	23 49 34.02	1.8668	4 44 51.5	9.805	14	1 19 32.61	1.9030	3 19 36.0	10.168
15	23 51 26.01	1.8663	4 35 2.6	9.825	15	1 21 26.85	1.9051	3 29 45.9	10.161
16	23 53 17.97	1.8659	4 25 12.5	9.845	16	1 23 21.22	1.9072	3 39 55.4	10.154
17	23 55 9.91	1.8655	4 15 21.2	9.864	17	1 25 15.72	1.9094	3 50 4.4	10.146
18	23 57 1.83	1.8652	4 5 28.8	9.883	18	1 27 10.35	1.9117	4 0 12.9	10.137
19	23 58 53.73	1.8649	3 55 35.3	9.901	19	1 29 5.12	1.9140	4 10 20.9	10.129
20	0 0 45.62	1.8647	3 45 40.7	9.919	20	1 31 0.03	1.9164	4 20 28.3	10.119
21	0 2 37.49	1.8645	3 35 45.0	9.936	21	1 32 55.09	1.9188	4 30 35.2	10.109
22	0 4 29.35	1.8643	3 25 48.3	9.953	22	1 34 50.29	1.9213	4 40 41.4	10.098
23	0 6 21.21	1.8643	S. 3 15 50.7	9.969	23	1 36 45.65	1.9239	N. 4 50 47.0	10.086
MONDAY 18.					WEDNESDAY 20.				
0	0 8 13.07	1.8643	S. 3° 5' 52.1"	9.965	0	1 38 41.16	1.9265	N. 5° 0' 51.8"	10.074
1	0 10 4.92	1.8643	2 55 52.6	10.000	1	1 40 36.83	1.9292	5 10 55.9	10.062
2	0 11 56.78	1.8644	2 45 52.2	10.014	2	1 42 32.67	1.9320	5 20 59.2	10.048
3	0 13 48.64	1.8645	2 35 50.9	10.028	3	1 44 28.67	1.9348	5 31 1.7	10.034
4	0 15 40.51	1.8647	2 25 48.8	10.041	4	1 46 24.84	1.9376	5 41 3.3	10.019
5	0 17 32.39	1.8649	2 15 45.9	10.054	5	1 48 21.18	1.9405	5 51 4.0	10.004
6	0 19 24.29	1.8651	2 5 42.3	10.067	6	1 50 17.70	1.9435	6 1 3.7	9.988
7	0 21 16.21	1.8655	1 55 37.9	10.078	7	1 52 14.40	1.9465	6 11 2.5	9.971
8	0 23 8.15	1.8659	1 45 32.8	10.090	8	1 54 11.28	1.9496	6 21 0.2	9.953
9	0 25 0.12	1.8663	1 35 27.1	10.101	9	1 56 8.35	1.9527	6 30 56.8	9.935
10	0 26 52.11	1.8668	1 25 20.8	10.111	10	1 58 5.61	1.9559	6 40 52.3	9.916
11	0 28 44.14	1.8673	1 15 13.8	10.120	11	2 0 3.06	1.9592	6 50 46.7	9.896
12	0 30 36.20	1.8680	1 5 6.3	10.130	12	2 2 0.70	1.9625	7 0 39.9	9.876
13	0 32 28.30	1.8686	0 54 58.2	10.139	13	2 3 58.55	1.9658	7 10 31.8	9.855
14	0 34 20.44	1.8693	0 44 49.7	10.146	14	2 5 56.60	1.9692	7 20 22.5	9.833
15	0 36 12.62	1.8701	0 34 40.7	10.154	15	2 7 54.86	1.9727	7 30 11.8	9.810
16	0 38 4.85	1.8709	0 24 31.3	10.161	16	2 9 53.33	1.9762	7 39 59.7	9.787
17	0 39 57.13	1.8718	0 14 21.5	10.167	17	2 11 52.01	1.9798	7 49 46.2	9.763
18	0 41 49.46	1.8727	S. 0 4 11.3	10.173	18	2 13 50.91	1.9834	7 59 31.2	9.738
19	0 43 41.85	1.8737	N. 0 5 59.2	10.177	19	2 15 50.03	1.9871	8 9 14.8	9.713
20	0 45 34.30	1.8747	0 16 10.0	10.182	20	2 17 49.37	1.9909	8 18 56.8	9.687
21	0 47 26.82	1.8758	0 26 21.0	10.186	21	2 19 48.94	1.9947	8 28 37.2	9.660
22	0 49 19.40	1.8770	0 36 32.3	10.189	22	2 21 48.73	1.9986	8 38 16.0	9.632
23	0 51 12.06	1.8782	0 46 43.8	10.193	23	2 23 48.76	2.0025	8 47 53.1	9.603
24	0 53 4.79	1.8795	N. 0 56 55.5	10.195	24	2 25 49.03	2.0065	N. 8 57 28.4	9.574

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 21.					SATURDAY 23.				
0	2 25 49.03	2.0085	N. 8 57' 28.4"	9.574	0	4 7 37.71	2.2510	N. 15 46' 20.1"	7.068
1	2 27 49.54	2.0105	9 7 2.0	9.544	1	4 9 52.95	2.2569	15 53 23.1	7.011
2	2 29 50.29	2.0146	9 16 33.7	9.513	2	4 12 8.54	2.2628	16 0 21.4	6.933
3	2 31 51.29	2.0187	9 26 3.5	9.481	3	4 14 24.48	2.2687	16 7 15.0	6.854
4	2 33 52.54	2.0229	9 35 31.4	9.448	4	4 16 40.78	2.2740	16 14 3.8	6.773
5	2 35 54.04	2.0271	9 44 57.3	9.414	5	4 18 57.44	2.2806	16 20 47.8	6.692
6	2 37 55.80	2.0314	9 54 21.1	9.380	6	4 21 14.45	2.2865	16 27 26.8	6.609
7	2 39 57.81	2.0358	10 3 42.9	9.345	7	4 23 31.82	2.2924	16 34 0.9	6.525
8	2 42 0.09	2.0402	10 13 2.5	9.309	8	4 25 49.54	2.2984	16 40 29.9	6.440
9	2 44 2.63	2.0446	10 22 19.9	9.272	9	4 28 7.62	2.3043	16 46 53.8	6.354
10	2 46 5.44	2.0491	10 31 35.1	9.234	10	4 30 26.06	2.3103	16 53 12.5	6.267
11	2 48 8.53	2.0537	10 40 48.0	9.195	11	4 32 44.85	2.3162	16 59 25.9	6.179
12	2 50 11.89	2.0583	10 49 58.5	9.156	12	4 35 4.00	2.3221	17 5 33.9	6.089
13	2 52 15.53	2.0630	10 59 6.7	9.116	13	4 37 23.51	2.3281	17 11 36.5	5.998
14	2 54 19.45	2.0677	11 8 12.4	9.075	14	4 39 43.37	2.3340	17 17 33.7	5.906
15	2 56 23.65	2.0724	11 17 15.6	9.032	15	4 42 3.59	2.3399	17 23 25.3	5.813
16	2 58 28.14	2.0772	11 26 16.3	8.989	16	4 44 24.16	2.3458	17 29 11.3	5.719
17	3 0 32.91	2.0820	11 35 14.3	8.945	17	4 46 45.09	2.3517	17 34 51.6	5.624
18	3 2 37.98	2.0869	11 44 9.7	8.900	18	4 49 6.37	2.3576	17 40 26.2	5.527
19	3 4 43.34	2.0918	11 53 2.4	8.854	19	4 51 28.00	2.3634	17 45 54.9	5.430
20	3 6 49.00	2.0968	12 1 52.3	8.807	20	4 53 49.98	2.3693	17 51 17.7	5.331
21	3 8 54.96	2.1018	12 10 39.3	8.760	21	4 56 12.31	2.3751	17 56 34.6	5.231
22	3 11 1.22	2.1069	12 19 23.5	8.711	22	4 58 34.99	2.3809	18 1 45.5	5.130
23	3 13 7.79	2.1120	N. 12 28 4.7	8.662	23	5 0 58.01	2.3867	N. 18 6 50.2	5.028
FRIDAY 22.					SUNDAY 24.				
0	3 15 14.67	2.1172	N. 12 36 42.9	8.611	0	5 3 21.38	2.3924	N. 18 11 48.8	4.924
1	3 17 21.85	2.1224	12 45 18.0	8.560	1	5 5 45.10	2.3981	18 16 41.2	4.820
2	3 19 29.35	2.1276	12 53 50.0	8.507	2	5 8 9.16	2.4038	18 21 27.2	4.714
3	3 21 37.16	2.1329	13 2 18.8	8.453	3	5 10 33.56	2.4095	18 26 6.9	4.608
4	3 23 45.29	2.1382	13 10 44.4	8.399	4	5 12 58.30	2.4151	18 30 40.2	4.500
5	3 25 53.74	2.1435	13 19 6.7	8.344	5	5 15 23.37	2.4207	18 35 6.9	4.391
6	3 28 2.51	2.1489	13 27 25.6	8.287	6	5 17 48.78	2.4262	18 39 27.1	4.281
7	3 30 11.61	2.1543	13 35 41.1	8.229	7	5 20 14.52	2.4317	18 43 40.6	4.170
8	3 32 21.03	2.1598	13 43 53.1	8.171	8	5 22 40.58	2.4372	18 47 47.5	4.058
9	3 34 30.78	2.1653	13 52 1.6	8.111	9	5 25 6.97	2.4426	18 51 47.6	3.944
10	3 36 40.86	2.1708	14 0 6.5	8.050	10	5 27 33.69	2.4480	18 55 40.8	3.830
11	3 38 51.28	2.1764	14 8 7.7	7.989	11	5 30 0.73	2.4533	18 59 27.1	3.714
12	3 41 2.03	2.1820	14 16 5.2	7.926	12	5 32 28.08	2.4586	19 3 6.5	3.598
13	3 43 13.12	2.1876	14 23 58.9	7.862	13	5 34 55.75	2.4638	19 6 38.8	3.480
14	3 45 24.54	2.1932	14 31 48.7	7.797	14	5 37 23.73	2.4690	19 10 4.1	3.362
15	3 47 36.31	2.1989	14 39 34.6	7.731	15	5 39 52.02	2.4741	19 13 22.3	3.243
16	3 49 48.42	2.2046	14 47 16.5	7.664	16	5 42 20.62	2.4791	19 16 33.3	3.122
17	3 52 0.87	2.2104	14 54 54.3	7.596	17	5 44 49.52	2.4840	19 19 37.0	3.001
18	3 54 13.66	2.2161	15 2 28.0	7.527	18	5 47 18.71	2.4890	19 22 33.4	2.879
19	3 56 26.80	2.2219	15 9 57.5	7.457	19	5 49 48.19	2.4938	19 25 22.5	2.756
20	3 58 40.29	2.2277	15 17 22.8	7.385	20	5 52 17.96	2.4986	19 28 4.1	2.632
21	4 0 54.12	2.2335	15 24 43.8	7.313	21	5 54 48.02	2.5033	19 30 38.2	2.506
22	4 3 8.30	2.2393	15 32 0.4	7.239	22	5 57 18.36	2.5079	19 33 4.8	2.380
23	4 5 22.83	2.2452	15 39 12.5	7.164	23	5 59 48.97	2.5125	19 35 23.8	2.253
24	4 7 37.71	2.2510	N. 15 46 20.1	7.088	24	6 2 19.85	2.5170	N. 19 37 35.2	2.125

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 25.					WEDNESDAY 27.				
0	6 2 19.85	2.5170	N.19° 37' 35.2"	2.195	0	8 6 31.13	2.6163	N.18° 41' 19.2"	4.559
1	6 4 51.00	2.5214	19 39 38.8	1.996	1	8 9 8.09	2.6157	18 36 41.5	4.698
2	6 7 22.42	2.5258	19 41 34.7	1.866	2	8 11 45.01	2.6149	18 31 55.4	4.836
3	6 9 54.09	2.5301	19 43 22.8	1.736	3	8 14 21.88	2.6141	18 27 1.1	4.974
4	6 12 26.02	2.5343	19 45 3.0	1.605	4	8 16 58.70	2.6131	18 21 58.5	5.111
5	6 14 58.20	2.5383	19 46 35.3	1.473	5	8 19 35.46	2.6121	18 16 47.7	5.247
6	6 17 30.62	2.5423	19 47 59.7	1.340	6	8 22 12.15	2.6110	18 11 28.8	5.383
7	6 20 3.28	2.5462	19 49 16.2	1.207	7	8 24 48.77	2.6097	18 6 1.8	5.518
8	6 22 36.17	2.5500	19 50 24.6	1.073	8	8 27 25.32	2.6084	18 0 26.7	5.652
9	6 25 9.28	2.5538	19 51 24.9	0.939	9	8 30 1.78	2.6069	17 54 43.6	5.785
10	6 27 42.62	2.5574	19 52 17.2	0.803	10	8 32 38.15	2.6054	17 48 52.5	5.918
11	6 30 16.17	2.5610	19 53 1.3	0.667	11	8 35 14.43	2.6037	17 42 53.4	6.050
12	6 32 49.93	2.5644	19 53 37.2	0.530	12	8 37 50.60	2.6020	17 36 46.5	6.181
13	6 35 23.90	2.5678	19 54 4.9	0.393	13	8 40 26.67	2.6002	17 30 31.7	6.311
14	6 37 58.06	2.5710	19 54 24.3	0.255	14	8 43 2.62	2.5982	17 24 9.1	6.441
15	6 40 32.42	2.5742	19 54 35.4	0.116	15	8 45 38.46	2.5962	17 17 38.8	6.569
16	6 43 6.96	2.5772	19 54 38.2	0.083	16	8 48 14.17	2.5941	17 11 0.8	6.696
17	6 45 41.68	2.5801	19 54 32.7	0.162	17	8 50 49.76	2.5920	17 4 15.2	6.822
18	6 48 16.58	2.5830	19 54 18.8	0.301	18	8 53 25.21	2.5897	16 57 22.1	6.947
19	6 50 51.64	2.5857	19 53 56.5	0.442	19	8 56 0.53	2.5874	16 50 21.5	7.072
20	6 53 26.86	2.5883	19 53 25.8	0.582	20	8 58 35.70	2.5849	16 43 13.5	7.195
21	6 56 2.23	2.5908	19 52 46.6	0.723	21	9 1 10.72	2.5824	16 35 58.1	7.317
22	6 58 37.75	2.5932	19 51 58.9	0.865	22	9 3 45.59	2.5798	16 28 35.5	7.438
23	7 1 13.41	2.5955	N.19° 51' 2.7"	1.007	23	9 6 20.30	2.5772	N.16° 21' 5.6"	7.558
TUESDAY 26.					THURSDAY 28.				
0	7 3 49.20	2.5977	N.19° 49' 58.0"	1.149	0	9 8 54.85	2.5745	N.16° 13' 28.6"	7.676
1	7 6 25.13	2.5998	19 48 44.8	1.291	1	9 11 29.24	2.5716	16 5 44.5	7.794
2	7 9 1.18	2.6017	19 47 23.1	1.434	2	9 14 3.45	2.5687	15 57 53.4	7.910
3	7 11 37.34	2.6036	19 45 52.8	1.576	3	9 16 37.49	2.5658	15 49 55.3	8.025
4	7 14 13.61	2.6054	19 44 13.9	1.719	4	9 19 11.35	2.5628	15 41 50.4	8.139
5	7 16 49.98	2.6070	19 42 26.5	1.862	5	9 21 45.03	2.5597	15 33 38.7	8.251
6	7 19 26.45	2.6085	19 40 30.5	2.005	6	9 24 18.52	2.5566	15 25 20.3	8.362
7	7 22 3.00	2.6099	19 38 25.9	2.148	7	9 26 51.83	2.5535	15 16 55.2	8.473
8	7 24 39.63	2.6112	19 36 12.7	2.291	8	9 29 24.94	2.5502	15 8 23.6	8.580
9	7 27 16.34	2.6123	19 33 50.9	2.434	9	9 31 57.85	2.5469	14 59 45.5	8.687
10	7 29 53.11	2.6134	19 31 20.6	2.577	10	9 34 30.57	2.5436	14 51 1.1	8.793
11	7 32 29.94	2.6143	19 28 41.7	2.720	11	9 37 3.08	2.5402	14 42 10.3	8.898
12	7 35 6.83	2.6152	19 25 54.2	2.863	12	9 39 36.38	2.5367	14 33 13.3	9.001
13	7 37 43.76	2.6159	19 22 58.1	3.006	13	9 42 7.48	2.5332	14 24 10.2	9.108
14	7 40 20.73	2.6165	19 19 53.4	3.149	14	9 44 39.37	2.5296	14 15 1.0	9.209
15	7 42 57.74	2.6170	19 16 40.2	3.292	15	9 47 11.04	2.5260	14 5 45.9	9.301
16	7 45 34.77	2.6173	19 13 18.4	3.434	16	9 49 42.50	2.5224	13 56 24.9	9.392
17	7 48 11.82	2.6176	19 9 48.1	3.576	17	9 52 13.74	2.5188	13 46 58.1	9.494
18	7 50 48.88	2.6177	19 6 9.3	3.717	18	9 54 44.75	2.5151	13 37 25.6	9.588
19	7 53 25.95	2.6178	19 2 22.0	3.859	19	9 57 15.55	2.5114	13 27 47.5	9.681
20	7 56 3.02	2.6177	18 58 26.3	3.999	20	9 59 46.12	2.5076	13 18 3.9	9.773
21	7 58 40.08	2.6175	18 54 22.2	4.140	21	10 2 16.46	2.5038	13 8 14.9	9.862
22	8 1 17.12	2.6172	18 50 9.6	4.280	22	10 4 46.58	2.5000	12 58 20.5	9.950
23	8 3 54.14	2.6168	18 45 48.6	4.420	23	10 7 16.46	2.4962	12 48 20.9	10.036
24	8 6 31.13	2.6163	N.18° 41' 19.2"	4.559	24	10 9 46.11	2.4923	N.12° 38' 16.1"	10.121

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 29.					SUNDAY 31.				
0	10 9 46.11	2.4893	N. 12° 38' 16.1"	10.121	0	12 4 52.82	2.3099	N. 3° 24' 48.5"	12.329
1	10 12 15.53	2.4894	12 28 6.3	10.305	1	12 7 11.32	2.3067	3 12 28.5	12.337
2	10 14 44.71	2.4844	12 17 51.5	10.387	2	12 9 29.62	2.3035	3 0 8.1	12.344
3	10 17 13.66	2.4805	12 7 31.8	10.367	3	12 11 47.74	2.3004	2 47 47.3	12.349
4	10 19 42.37	2.4765	11 57 7.4	10.446	4	12 14 5.67	2.2973	2 35 26.2	12.353
5	10 22 10.84	2.4726	11 46 38.3	10.594	5	12 16 23.41	2.2942	2 23 4.9	12.355
6	10 24 39.08	2.4686	11 36 4.6	10.599	6	12 18 40.97	2.2912	2 10 43.5	12.356
7	10 27 7.08	2.4646	11 25 26.4	10.673	7	12 20 58.36	2.2883	1 58 22.1	12.356
8	10 29 34.83	2.4606	11 14 43.8	10.746	8	12 23 15.57	2.2854	1 46 0.8	12.354
9	10 32 2.35	2.4566	11 3 56.9	10.816	9	12 25 32.61	2.2825	1 33 39.6	12.351
10	10 34 29.63	2.4526	10 53 5.8	10.885	10	12 27 49.48	2.2797	1 21 18.6	12.347
11	10 36 56.66	2.4485	10 42 10.7	10.953	11	12 30 6.18	2.2769	1 8 57.9	12.341
12	10 39 23.45	2.4445	10 31 11.5	11.019	12	12 32 22.71	2.2742	0 56 37.7	12.334
13	10 41 50.00	2.4405	10 20 8.4	11.083	13	12 34 39.08	2.2715	0 44 17.9	12.326
14	10 44 16.31	2.4365	10 9 1.5	11.146	14	12 36 55.29	2.2688	0 31 58.6	12.316
15	10 46 42.38	2.4324	9 57 50.9	11.207	15	12 39 11.34	2.2662	0 19 40.0	12.305
16	10 49 8.21	2.4284	9 46 36.7	11.266	16	12 41 27.23	2.2636	N. 0 7 22.0	12.293
17	10 51 33.79	2.4244	9 35 18.9	11.324	17	12 43 42.97	2.2611	S. 0 4 55.2	12.279
18	10 53 59.14	2.4204	9 23 57.7	11.381	18	12 45 58.56	2.2586	0 17 11.5	12.264
19	10 56 24.25	2.4165	9 12 33.2	11.435	19	12 48 14.01	2.2562	0 29 26.9	12.248
20	10 58 49.12	2.4125	9 1 5.5	11.488	20	12 50 29.31	2.2539	0 41 41.3	12.231
21	11 1 13.75	2.4085	8 49 34.7	11.539	21	12 52 44.47	2.2516	0 53 54.6	12.213
22	11 3 38.14	2.4045	8 38 0.8	11.589	22	12 54 59.50	2.2493	1 6 6.8	12.193
23	11 6 2.29	2.4006	N. 8 26 24.0	11.637	23	12 57 14.39	2.2470	S. 1 18 17.8	12.172
SATURDAY 30.					MONDAY, FEBRUARY 1.				
0	11 8 26.20	2.3966	N. 8 14 44.3	11.684	0	12 59 29.15	2.2448	S. 1 30 27.5	12.150
1	11 10 49.88	2.3927	8 3 1.9	11.729	PHASES OF THE MOON.				
2	11 13 13.32	2.3888	7 51 16.9	11.772					
3	11 15 36.53	2.3849	7 39 29.3	11.813					
4	11 17 59.51	2.3810	7 27 39.3	11.853	☾ Last Quarter, . . . 4 18 22.7				
5	11 20 22.26	2.3772	7 15 46.9	11.892					
6	11 22 44.78	2.3734	7 3 52.2	11.929					
7	11 25 7.07	2.3696	6 51 55.4	11.964	● New Moon, . . . 12 6 53.0				
8	11 27 29.14	2.3659	6 39 56.5	11.998					
9	11 29 50.98	2.3621	6 27 55.6	12.030					
10	11 32 12.60	2.3584	6 15 52.9	12.061	☽ First Quarter, . . . 20 12 26.3				
11	11 34 34.00	2.3548	6 3 48.4	12.090					
12	11 36 55.17	2.3511	5 51 42.2	12.117					
13	11 39 16.13	2.3475	5 39 34.4	12.143	○ Full Moon, . . . 27 13 30.4				
14	11 41 36.87	2.3439	5 27 25.0	12.168					
15	11 43 57.40	2.3403	5 15 14.2	12.190					
16	11 46 17.71	2.3368	5 3 2.1	12.212	☾ Apogee, . . . . . 16 5.9				
17	11 48 37.81	2.3333	4 50 48.8	12.233					
18	11 50 57.71	2.3298	4 38 34.4	12.250					
19	11 53 17.40	2.3264	4 26 18.9	12.267	☾ Perigee, . . . . . 28 13.2				
20	11 55 36.88	2.3230	4 14 2.4	12.283					
21	11 57 56.16	2.3197	4 1 45.0	12.296					
22	12 0 15.25	2.3164	3 49 26.8	12.308					
23	12 2 34.13	2.3131	3 37 8.0	12.319					
24	12 4 52.82	2.3099	N. 3 24 48.5	12.329					

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Aldebaran	W.	73° 16' 24"	2133	75° 6' 48"	2136	76° 57' 4"	2134	78° 47' 12"	2139
	Pollux	W.	30 18 5	2396	32 3 24	2319	33 49 6	2301	35 85 4	2291
	Spica	E.	60 55 37	2164	59 6 15	2170	57 17 3	2177	55 28 1	2184
	Antares	E.	106 46 56	2187	104 58 9	2180	103 9 27	2195	101 20 52	2200
	Venus	E.	108 58 54	2515	107 18 1	2519	105 37 14	2524	103 56 34	2530
	Saturn	E.	110 48 41	2163	108 59 18	2168	107 10 2	2179	105 20 53	2178
	SUN	E.	140 4 7	2450	138 21 44	2455	136 39 27	2459	134 57 16	2465
2	Aldebaran	W.	87 55 36	2173	89 44 45	2180	91 33 42	2188	93 22 27	2196
	Pollux	W.	44 27 9	2378	46 13 41	2379	48 0 11	2383	49 46 36	2385
	Spica	E.	46 25 56	2329	44 38 16	2344	42 50 54	2357	41 3 51	2370
	Antares	E.	92 19 59	2331	90 32 18	2339	88 44 48	2347	86 57 31	2356
	Venus	E.	95 35 33	2566	93 55 52	2575	92 16 23	2584	90 37 6	2593
	Saturn	E.	96 17 22	2211	94 29 11	2219	92 41 12	2227	90 53 25	2235
	SUN	E.	126 28 22	2497	124 47 4	2504	123 5 57	2513	121 25 2	2522
3	Pollux	W.	58 37 3	2315	60 22 41	2322	62 8 9	2330	63 53 25	2338
	Regulus	W.	22 14 35	2244	24 1 57	2254	25 49 4	2264	27 35 57	2274
	Antares	E.	78 4 29	2305	76 18 37	2316	74 33 1	2327	72 47 41	2330
	Saturn	E.	81 57 46	2283	80 11 21	2292	78 25 10	2302	76 39 14	2313
	Venus	E.	82 24 1	2645	80 46 7	2655	79 8 27	2666	77 31 2	2678
	SUN	E.	113 3 38	2570	111 24 2	2580	109 44 40	2591	108 5 33	2601
4	Pollux	W.	72 36 36	2384	74 20 33	2384	76 4 16	2404	77 47 45	2415
	Regulus	W.	36 26 31	2397	38 11 51	2337	39 56 56	2349	41 41 44	2359
	Mars	W.	29 28 56	2337	31 14 1	2346	32 58 52	2356	34 43 30	2366
	Antares	E.	64 5 22	2401	62 21 48	2415	60 38 34	2428	58 55 39	2442
	Saturn	E.	67 53 28	2367	66 9 6	2379	64 25 1	2389	62 41 11	2401
	Venus	E.	69 27 49	2737	67 51 58	2749	66 16 23	2759	64 41 5	2774
	SUN	E.	99 53 45	2659	98 16 10	2670	96 38 50	2689	95 1 46	2694
5	Pollux	W.	86 21 27	2467	88 3 26	2479	89 45 9	2489	91 26 37	2500
	Regulus	W.	50 21 49	2415	52 5 2	2426	53 48 0	2436	55 30 43	2448
	Mars	W.	43 23 2	2417	45 6 13	2427	46 49 9	2437	48 31 51	2448
	Antares	E.	50 26 11	2518	48 45 23	2534	47. 4 57	2551	45 24 55	2569
	Saturn	E.	54 6 8	2458	52 23 56	2470	50 42 0	2481	49 0 20	2493
	Venus	E.	56 48 35	2636	55 14 54	2648	53 41 28	2661	52 8 19	2673
	SUN	E.	87 0 22	2753	85 24 52	2765	83 49 38	2776	82 14 39	2788
6	Regulus	W.	64 0 27	2501	65 41 39	2512	67 22 36	2522	69 3 19	2533
	Mars	W.	57 1 44	2497	58 43 1	2507	60 24 4	2517	62 4 54	2527
	Antares	E.	37 11 17	2674	35 34 2	2700	33 57 20	2726	32 21 15	2756
	Saturn	E.	40 36 5	2551	38 56 2	2563	37 16 16	2574	35 36 46	2586
	Venus	E.	44 26 34	2636	42 55 1	2648	41 23 43	2661	39 52 41	2673
	SUN	E.	74 23 35	2646	72 50 7	2658	71 16 54	2669	69 43 55	2680
7	Regulus	W.	77 23 20	2583	79 2 39	2592	80 41 45	2601	82 20 38	2612
	Mars	W.	70 25 42	2574	72 5 13	2583	73 44 31	2592	75 23 37	2601
	Spica	W.	24 27 23	2754	26 2 51	2746	27 38 30	2739	29 14 18	2735
	Venus	E.	32 21 26	3037	30 51 59	3050	29 22 48	3064	27 53 54	3077
	SUN	E.	62 2 31	2935	60 30 56	2945	58 59 34	2955	57 28 25	2966
8	Regulus	W.	90 31 48	2657	92 9 25	2667	93 46 49	2676	95 24 1	2684
	Mars	W.	83 36 6	2644	85 14 1	2653	86 51 44	2661	88 29 16	2669
	Spica	W.	37 13 51	2739	38 49 39	2742	40 25 23	2746	42 1 2	2750



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Aldebaran W.	80° 37' 12"	2145	82° 27' 3"	2151	84° 16' 44"	2158	86° 6' 15"	2165
	Pollux W.	37 21 16	2285	39 7 37	2281	40 54 5	2279	42 40 36	2277
	Spica E.	53 39 9	2192	51 50 30	2201	50 2 4	2210	48 13 52	2221
	Antares E.	99 32 24	2205	97 44 4	2211	95 55 53	2217	94 7 51	2224
	Venus E.	102 16 3	2537	100 35 41	2543	98 55 28	2551	97 15 25	2559
	Saturn E.	103 31 52	2184	101 43 0	2190	99 54 17	2196	98 5 44	2204
	Sun E.	133 15 13	2470	131 33 17	2475	129 51 29	2482	128 9 51	2489
2	Aldebaran W.	95 11 0	2206	96 59 19	2214	98 47 25	2224	100 35 17	2234
	Pollux W.	51 32 57	2290	53 19 11	2296	55 5 17	2301	56 51 15	2309
	Spica E.	39 17 8	2285	37 30 47	2300	35 44 48	2318	33 59 15	2336
	Antares E.	85 10 26	2265	83 23 35	2275	81 36 59	2285	79 50 37	2294
	Venus E.	88 58 2	2603	87 19 11	2613	85 40 34	2623	84 2 10	2634
	Saturn E.	89 5 50	2244	87 18 28	2253	85 31 20	2263	83 44 26	2272
	Sun E.	119 44 19	2531	118 3 49	2540	116 23 32	2550	114 43 28	2560
3	Pollux W.	65 38 29	2347	67 23 20	2355	69 7 59	2365	70 52 24	2374
	Regulus W.	29 22 34	2285	31 8 56	2295	32 55 3	2305	34 40 55	2316
	Antares E.	71 2 38	2350	69 17 52	2363	67 33 24	2375	65 49 14	2388
	Saturn E.	74 53 34	2294	73 8 9	2324	71 22 59	2346	69 38 6	2358
	Venus E.	75 53 52	2629	74 16 58	2701	72 40 19	2713	71 3 56	2725
	Sun E.	106 26 41	2613	104 48 4	2624	103 9 42	2636	101 31 36	2647
4	Pollux W.	79 30 59	2424	81 14 0	2436	82 56 44	2445	84 39 14	2458
	Regulus W.	43 26 17	2371	45 10 34	2382	46 54 35	2393	48 38 20	2404
	Mars W.	36 27 53	2376	38 12 2	2386	39 55 57	2396	41 39 37	2407
	Antares E.	57 13 4	2456	55 30 49	2471	53 48 55	2486	52 7 22	2502
	Saturn E.	60 57 38	2419	59 14 21	2424	57 31 20	2436	55 48 36	2447
	Venus E.	63 6 3	2786	61 31 17	2798	59 56 47	2811	58 22 33	2823
	Sun E.	93 24 58	2702	91 48 26	2717	90 12 9	2729	88 36 8	2741
5	Pollux W.	93 7 50	2512	94 48 47	2522	96 29 29	2533	98 9 56	2543
	Regulus W.	57 13 10	2458	58 55 22	2469	60 37 19	2480	62 19 0	2490
	Mars W.	50 14 18	2458	51 56 31	2468	53 38 29	2478	55 20 13	2487
	Antares E.	43 45 17	2588	42 6 6	2607	40 27 21	2628	38 49 4	2650
	Saturn E.	47 18 57	2504	45 37 50	2516	43 56 59	2527	42 16 24	2539
	Venus E.	50 35 26	2696	49 2 49	2696	47 30 28	2691	45 58 23	2694
	Sun E.	80 39 56	2600	79 5 28	2611	77 31 15	2624	75 57 18	2635
6	Regulus W.	70 43 47	2543	72 24 1	2553	74 4 1	2562	75 43 48	2573
	Mars W.	63 45 30	2536	65 25 53	2546	67 6 2	2556	68 45 58	2564
	Antares E.	30 45 50	2790	29 11 9	2827	27 37 16	2869	26 4 18	2916
	Saturn E.	33 57 32	2590	32 18 35	2610	30 39 54	2626	29 1 34	2639
	Venus E.	38 21 54	2985	36 51 23	2996	35 21 8	3011	33 51 9	3024
	Sun E.	68 11 10	2621	66 38 40	2621	65 6 23	2612	63 34 20	2594
7	Regulus W.	83 59 17	2621	85 37 44	2630	87 15 58	2640	88 53 59	2649
	Mars W.	77 2 31	2610	78 41 13	2619	80 19 42	2627	81 58 0	2636
	Spica W.	30 50 11	2733	32 26 7	2733	34 2 3	2734	35 37 58	2735
	Venus E.	26 25 16	3091	24 56 56	3107	23 28 55	3123	22 1 13	3139
	Sun E.	55 57 30	2677	54 26 48	2686	52 56 18	2697	51 26 1	2707
8	Regulus W.	97 1 2	2693	98 37 51	2701	100 14 29	2710	101 50 55	2718
	Mars W.	90 6 37	2678	91 43 47	2686	93 20 46	2694	94 57 34	2701
	Spica W.	43 36 36	2756	45 12 2	2761	46 47 21	2766	48 22 33	2772

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
8	SUN	E.	49° 55' 57"	3017	48° 26' 5"	3027	46° 56' 26"	3037	45° 26' 59"	3047
9	Mars	W.	96 34 12	2710	98 10 39	2717	99 46 56	2725	101 23 2	2733
	Spica	W.	49 57 37	2778	51 32 34	2785	53 7 22	2791	54 42 2	2797
	SUN	E.	38 2 44	3006	36 34 29	3105	35 6 25	3114	33 38 33	3124
15	SUN	W.	29 48 1	3453	31 9 18	3456	32 30 31	3459	33 51 41	3463
	Jupiter	E.	42 40 47	3119	41 13 0	3124	39 45 19	3129	38 17 44	3133
	α Arietis	E.	71 1 46	3228	69 36 10	3224	68 10 41	3242	66 45 21	3249
	Aldebaran	E.	102 34 34	3054	101 5 28	3057	99 36 26	3061	98 7 29	3065
16	SUN	W.	40 36 46	3472	41 57 41	3474	43 18 34	3475	44 39 26	3476
	α Arietis	E.	59 40 55	3228	58 16 30	3226	56 52 14	3206	55 28 9	3214
	Aldebaran	E.	90 43 37	3077	89 14 59	3078	87 46 23	3079	86 17 48	3080
17	SUN	W.	51 23 41	3474	52 44 34	3472	54 5 29	3470	55 26 27	3468
	Fomalhaut	W.	24 34 20	3256	25 28 0	3225	26 24 36	3225	27 23 52	3223
	α Arietis	E.	48 30 31	3368	47 7 38	3380	45 44 59	3394	44 22 36	3410
	Aldebaran	E.	78 55 2	3080	77 26 28	3078	75 57 52	3077	74 29 14	3075
18	SUN	W.	62 12 3	3449	63 33 24	3445	64 54 50	3438	66 16 23	3433
	Fomalhaut	W.	32 51 34	4071	34 2 4	3090	35 13 53	3019	36 26 53	3256
	α Arietis	E.	37 35 39	3514	36 15 30	3543	34 55 53	3576	33 36 52	3613
	Aldebaran	E.	67 5 19	3059	65 36 19	3055	64 7 14	3049	62 38 2	3044
	Pollux	E.	111 1 28	3119	109 33 41	3113	108 5 47	3107	106 37 46	3101
19	SUN	W.	73 5 58	3395	74 28 20	3386	75 50 52	3378	77 13 34	3367
	Fomalhaut	W.	42 46 47	3605	44 5 16	3565	45 24 29	3528	46 44 22	3494
	α Pegasi	W.	31 26 58	4588	32 29 33	4453	33 34 7	4322	34 40 30	4223
	Aldebaran	E.	55 10 13	3010	53 40 13	3002	52 10 3	2994	50 39 43	2985
	Pollux	E.	99 15 39	3065	97 46 46	3056	96 17 42	3047	94 48 27	3038
20	SUN	W.	84 10 8	3311	85 34 7	3298	86 58 21	3284	88 22 51	3271
	Fomalhaut	W.	53 32 54	3343	54 56 16	3316	56 20 9	3290	57 44 32	3265
	α Pegasi	W.	40 35 15	3814	41 50 3	3750	43 5 57	3693	44 22 52	3638
	Aldebaran	E.	43 5 0	2933	41 33 23	2922	40 1 32	2900	38 29 25	2898
	Pollux	E.	87 19 13	2966	85 48 43	2974	84 17 58	2962	82 46 58	2951
21	SUN	W.	95 29 29	3196	96 55 43	3180	98 22 16	3163	99 49 10	3146
	Fomalhaut	W.	64 53 42	3147	66 20 55	3124	67 48 36	3102	69 16 43	3080
	α Pegasi	W.	51 1 5	3410	52 23 10	3371	53 46 0	3333	55 9 33	3297
	Jupiter	W.	28 28 11	2907	30 0 21	2890	31 32 53	2873	33 5 47	2855
	Pollux	E.	75 8 4	2885	73 35 26	2871	72 2 30	2857	70 29 16	2842
	Mars	E.	116 2 43	2757	114 27 19	2742	112 51 35	2726	111 15 30	2710
22	SUN	W.	107 8 56	3056	108 38 0	3036	110 7 28	3017	111 37 20	2997
	α Pegasi	W.	62 17 19	3138	63 44 45	3106	65 12 47	3078	66 41 24	3050
	Jupiter	W.	40 55 59	2766	42 31 12	2747	44 6 49	2729	45 42 50	2710
	Pollux	E.	62 38 18	2767	61 3 7	2752	59 27 36	2737	57 51 45	2721
	Regulus	E.	98 12 51	2699	96 36 10	2681	94 59 5	2664	93 21 37	2646
	Mars	E.	103 9 39	2626	101 31 20	2608	99 52 36	2590	98 13 27	2572
23	SUN	W.	119 12 50	2697	120 45 13	2676	122 18 2	2656	123 51 17	2635
	α Pegasi	W.	74 12 51	2920	75 44 45	2894	77 17 11	2871	78 50 7	2848
	Jupiter	W.	53 49 15	2615	55 27 50	2596	57 6 51	2576	58 46 19	2556

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
8	SUN	E.	43° 57' 44"	3058	42° 28' 41"	3066	40° 59' 50"	3078	39° 31' 11"	3088
9	Mars	W.	102 58 58	2741	104 34 44	2748	106 10 20	2756	107 45 46	2764
	Spica	W.	56 16 34	2804	57 50 57	2811	59 25 11	2817	60 59 17	2824
	SUN	E.	32 10 53	3133	30 43 24	3143	29 16 6	3153	27 49 0	3163
15	SUN	W.	35 12 47	3465	36 33 50	3467	37 54 51	3470	39 15 49	3471
	Jupiter	E.	36 50 14	3137	35 22 49	3141	33 55 29	3145	32 28 14	3149
	α Arietis	E.	65 20 10	3256	63 55 7	3264	62 30 14	3272	61 5 30	3280
	Aldebaran	E.	96 38 36	3068	95 9 47	3070	93 41 1	3073	92 12 18	3074
16	SUN	W.	46 0 17	3476	47 21 8	3477	48 41 58	3476	50 2 49	3475
	α Arietis	E.	54 4 14	3324	52 40 30	3334	51 16 58	3344	49 53 38	3357
	Aldebaran	E.	84 49 14	3081	83 20 41	3081	81 52 8	3081	80 23 35	3081
17	SUN	W.	56 47 27	3465	58 8 30	3462	59 29 37	3458	60 50 48	3454
	Fomalhaut	W.	28 25 31	4505	29 29 19	4375	30 35 3	4261	31 42 32	4162
	α Arietis	E.	43 0 31	3427	41 38 45	3445	40 17 19	3465	38 56 16	3488
	Aldebaran	E.	73 0 34	3073	71 31 51	3069	70 3 4	3066	68 34 13	3064
18	SUN	W.	67 38 2	3426	68 59 49	3420	70 21 43	3412	71 43 46	3404
	Fomalhaut	W.	37 40 58	3795	38 56 5	3742	40 12 8	3693	41 29 3	3647
	α Arietis	E.	32 18 32	3656	31 0 58	3707	29 44 18	3765	28 28 39	3832
	Aldebaran	E.	61 8 44	3038	59 39 18	3032	58 9 45	3025	56 40 3	3018
	Pollux	E.	105 9 38	3095	103 41 22	3087	102 12 57	3080	100 44 23	3072
19	SUN	W.	78 36 28	3357	79 59 34	3346	81 22 52	3335	82 46 23	3323
	Fomalhaut	W.	48 4 53	3461	49 26 1	3429	50 47 45	3399	52 10 3	3370
	α Pegasi	W.	35 48 34	4127	36 58 10	4037	38 9 13	3956	39 21 36	3881
	Aldebaran	E.	49 9 11	2975	47 38 27	2965	46 7 31	2955	44 36 22	2945
	Pollux	E.	93 19 1	3028	91 49 23	3018	90 19 33	3008	88 49 30	2997
20	SUN	W.	89 47 36	3257	91 12 38	3243	92 37 57	3227	94 3 34	3212
	Fomalhaut	W.	59 9 25	3240	60 34 47	3216	62 0 37	3192	63 26 56	3169
	α Pegasi	W.	45 40 45	3587	46 59 33	3539	48 19 14	3493	49 39 46	3451
	Aldebaran	E.	36 57 3	2884	35 24 24	2871	33 51 28	2857	32 18 14	2843
	Pollux	E.	81 15 44	2939	79 44 14	2925	78 12 27	2912	76 40 24	2899
21	SUN	W.	101 16 24	3129	102 43 59	3110	104 11 56	3092	105 40 15	3074
	Fomalhaut	W.	70 45 17	3058	72 14 18	3037	73 43 45	3015	75 13 39	2994
	α Pegasi	W.	56 33 48	3263	57 58 43	3230	59 24 17	3198	60 50 29	3166
	Jupiter	W.	34 39 4	2838	36 12 43	2820	37 46 45	2802	39 21 10	2784
	Pollux	E.	68 55 43	2828	67 21 51	2813	65 47 39	2798	64 13 8	2783
	Mars	E.	109 39 4	2695	108 2 17	2678	106 25 7	2661	104 47 35	2643
22	SUN	W.	113 7 36	2977	114 38 17	2958	116 9 23	2938	117 40 54	2918
	α Pegasi	W.	68 10 35	3022	69 40 20	2996	71 10 38	2969	72 41 29	2945
	Jupiter	W.	47 19 16	2692	48 56 7	2672	50 33 24	2654	52 11 6	2634
	Pollux	E.	56 15 33	2706	54 39 1	2690	53 2 8	2676	51 24 56	2662
	Regulus	E.	91 43 45	2628	90 5 28	2609	88 26 45	2591	86 47 37	2573
	Mars	E.	96 33 54	2553	94 53 55	2535	93 13 31	2517	91 32 41	2498
23	SUN	W.	125 24 59	2815	126 59 8	2794	128 33 44	2773	130 8 47	2752
	α Pegasi	W.	80 23 32	2825	81 57 27	2803	83 31 51	2782	85 6 43	2760
	Jupiter	W.	60 26 14	2537	62 6 36	2517	63 47 25	2498	65 28 41	2479

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
23	$\alpha$ Arietis W.	30 54 41	3172	32 21 24	3100	33 49 34	3033	35 19 6	2973
	Pollux E.	49 47 25	2646	48 9 33	2633	46 31 23	2620	44 52 55	2607
	Regulus E.	85 8 4	2553	83 28 5	2534	81 47 39	2515	80 6 47	2497
	Mars E.	89 51 25	2479	88 9 42	2460	86 27 33	2441	84 44 57	2422
24	Jupiter W.	67 10 24	2459	68 52 35	2441	70 35 12	2422	72 18 16	2403
	$\alpha$ Arietis W.	43 3 57	2735	44 39 51	2685	46 16 37	2659	47 54 12	2625
	Pollux E.	36 36 38	2559	34 56 46	2555	33 16 49	2553	31 36 50	2553
	Regulus E.	71 35 46	2401	69 52 12	2383	68 8 12	2364	66 23 45	2345
	Mars E.	76 5 5	2326	74 19 44	2308	72 33 56	2289	70 47 41	2270
25	Jupiter W.	81 0 16	2313	82 45 57	2295	84 32 4	2279	86 18 35	2262
	$\alpha$ Arietis W.	56 13 5	2477	57 54 51	2452	59 37 12	2427	61 20 8	2404
	Aldebaran W.	22 34 30	2257	24 21 33	2239	26 9 2	2223	27 56 56	2206
	Regulus E.	57 34 51	2256	55 47 47	2239	54 0 17	2222	52 12 22	2206
	Mars E.	61 49 39	2182	60 0 44	2165	58 11 24	2149	56 21 39	2133
26	Jupiter W.	95 17 1	2188	97 5 47	2174	98 54 54	2161	100 44 20	2149
	$\alpha$ Arietis W.	70 2 38	2304	71 48 32	2287	73 34 50	2272	75 21 31	2256
	Aldebaran W.	37 2 19	2132	38 52 30	2118	40 43 1	2106	42 33 51	2094
	Regulus E.	43 6 57	2132	41 16 46	2118	39 26 15	2106	37 35 25	2094
	Mars E.	47 7 5	2061	45 15 5	2048	43 22 46	2036	41 30 8	2025
	Spica E.	96 53 46	2163	95 4 22	2149	93 14 38	2136	91 24 34	2124
27	$\alpha$ Arietis W.	84 20 1	2197	86 8 33	2188	87 57 18	2180	89 46 15	2174
	Aldebaran W.	51 52 24	2042	53 44 52	2034	55 37 33	2027	57 30 25	2020
	Mars E.	32 3 3	1982	30 9 1	1977	28 14 50	1973	26 20 33	1968
	Spica E.	82 9 59	2074	80 18 20	2066	78 26 29	2059	76 34 27	2053
28	Aldebaran W.	66 57 0	1998	68 50 37	1996	70 44 18	1994	72 38 1	1994
	Pollux W.	24 20 20	2307	26 6 10	2266	27 53 0	2232	29 40 40	2206
	Spica E.	67 12 20	2035	65 19 40	2034	63 26 59	2033	61 34 17	2035
	Antares E.	113 1 11	2067	111 9 21	2064	109 17 26	2061	107 25 26	2059
	Saturn E.	119 46 8	2030	117 53 21	2028	116 0 30	2026	114 7 36	2025
29	Aldebaran W.	82 6 27	2001	83 59 59	2006	85 53 24	2010	87 46 42	2016
	Pollux W.	38 46 43	2134	40 36 50	2128	42 27 7	2124	44 17 29	2122
	Spica E.	52 11 38	2053	50 19 27	2060	48 27 26	2068	46 35 38	2077
	Antares E.	98 5 11	2062	96 13 14	2066	94 21 22	2070	92 29 37	2075
	Saturn E.	104 43 11	2033	102 50 28	2036	100 57 50	2041	99 5 19	2046
30	Aldebaran W.	97 10 49	2052	99 3 2	2061	100 55 1	2071	102 46 45	2081
	Pollux W.	53 29 28	2132	55 19 38	2137	57 9 40	2144	58 59 32	2152
	Spica E.	37 20 40	2141	35 30 44	2159	33 41 15	2178	31 52 15	2201
	Antares E.	83 13 16	2113	81 22 36	2122	79 32 11	2133	77 42 2	2144
	Saturn E.	89 45 8	2082	87 53 41	2091	86 2 28	2101	84 11 30	2111
	Venus E.	121 8 39	2436	119 25 55	2445	117 43 24	2455	116 1 8	2466
31	Pollux W.	68 5 39	2200	69 54 7	2211	71 42 18	2224	73 30 10	2236
	Regulus W.	31 52 43	2140	33 42 41	2153	35 32 20	2166	37 21 39	2180
	Mars W.	29 37 39	2066	31 29 30	2077	33 21 5	2087	35 12 24	2099
	Antares E.	68 35 49	2209	66 47 35	2225	64 59 44	2240	63 12 16	2256
	Saturn E.	75 0 50	2170	73 11 37	2183	71 22 44	2197	69 34 12	2210
	Venus E.	107 33 54	2529	105 53 21	2543	104 13 8	2558	102 33 15	2573
	SUN E.	131 51 30	2449	130 9 5	2464	128 27 1	2478	126 45 17	2492

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
23	$\alpha$ Arietis	W.	36° 49' 53"	2917	38° 21' 50"	2866	39° 54' 53"	2819	41° 28' 56"	2775
	Pollux	E.	43 14 9	2595	41 35 7	2584	39 55 50	2574	38 16 20	2566
	Regulus	E.	78 25 29	2477	76 43 44	2458	75 1 32	2439	73 18 53	2419
	Mars	E.	83 1 53	2403	81 18 22	2384	79 34 24	2364	77 49 58	2346
24	Jupiter	W.	74 1 47	2384	75 45 45	2366	77 30 9	2348	79 14 59	2329
	$\alpha$ Arietis	W.	49 32 33	2592	51 11 39	2561	52 51 28	2532	54 31 57	2504
	Pollux	E.	29 56 51	2559	28 17 0	2569	26 37 22	2585	24 58 7	2610
	Regulus	E.	64 38 51	2328	62 53 30	2509	61 7 43	2291	59 21 30	2273
	Mars	E.	69 0 58	2252	67 13 48	2234	65 26 11	2216	63 38 8	2199
25	Jupiter	W.	88 5 31	2246	89 52 50	2231	91 40 31	2216	93 28 35	2201
	$\alpha$ Arietis	W.	63 3 37	2382	64 47 38	2361	66 32 9	2340	68 17 10	2322
	Aldebaran	W.	29 45 14	2190	31 33 56	2175	33 23 1	2160	35 12 29	2145
	Regulus	E.	50 24 3	2190	48 35 20	2175	46 46 15	2160	44 56 47	2145
	Mars	E.	54 31 30	2117	52 40 57	2103	50 50 2	2088	48 58 44	2074
26	Jupiter	W.	102 34 4	2137	104 24 6	2126	106 14 25	2116	108 4 59	2106
	$\alpha$ Arietis	W.	77 8 35	2243	78 55 59	2229	80 43 43	2218	82 31 44	2207
	Aldebaran	W.	44 25 0	2082	46 16 27	2071	48 8 11	2061	50 0 10	2052
	Regulus	E.	35 44 16	2083	33 52 50	2072	32 1 7	2061	30 9 8	2052
	Mars	E.	39 37 13	2014	37 44 1	2005	35 50 35	1996	33 56 55	1989
	Spica	E.	89 34 12	2113	87 43 32	2102	85 52 36	2092	84 1 25	2083
27	$\alpha$ Arietis	W.	91 35 22	2168	93 24 38	2163	95 14 1	2160	97 3 29	2157
	Aldebaran	W.	59 23 28	2014	61 16 40	2009	63 10 0	2005	65 3 27	2001
	Mars	E.	24 26 9	1968	22 31 45	1971	20 37 25	1977	18 43 13	1985
	Spica	E.	74 42 16	2048	72 49 56	2043	70 57 29	2040	69 4 57	2037
28	Aldebaran	W.	74 31 45	1994	76 25 29	1995	78 19 11	1996	80 12 51	1999
	Pollux	W.	31 28 59	2184	33 17 51	2167	35 7 9	2153	36 56 48	2142
	Spica	E.	59 41 37	2036	57 48 59	2039	55 56 26	2042	54 3 58	2048
	Antares	E.	105 33 23	2058	103 41 19	2057	101 49 14	2059	99 57 11	2061
	Saturn	E.	112 14 40	2025	110 21 45	2026	108 28 51	2027	106 35 59	2030
29	Aldebaran	W.	89 39 52	2021	91 32 53	2028	93 25 43	2035	95 18 22	2043
	Pollux	W.	46 7 58	2121	47 58 22	2122	49 48 48	2124	51 39 10	2127
	Spica	E.	44 44 3	2067	42 52 44	2099	41 1 43	2111	39 11 0	2126
	Antares	E.	90 38 0	2081	88 46 32	2088	86 55 15	2096	85 4 9	2104
	Saturn	E.	97 12 57	2052	95 20 43	2059	93 28 40	2066	91 36 48	2073
30	Aldebaran	W.	104 38 14	2091	106 29 27	2103	108 20 22	2115	110 10 59	2126
	Pollux	W.	60 49 12	2160	62 38 40	2169	64 27 54	2178	66 16 54	2188
	Spica	E.	30 3 49	2226	28 16 0	2254	26 28 53	2287	24 42 34	2325
	Antares	E.	75 52 10	2156	74 2 36	2169	72 13 21	2180	70 24 25	2195
	Saturn	E.	82 20 47	2122	80 30 21	2134	78 40 13	2145	76 50 22	2157
	Venus	E.	114 19 7	2478	112 37 23	2490	110 55 56	2502	109 14 46	2515
31	Pollux	W.	75 17 44	2249	77 4 58	2262	78 51 53	2277	80 38 26	2291
	Regulus	W.	39 10 37	2194	40 59 14	2208	42 47 30	2223	44 35 24	2237
	Mars	W.	37 3 25	2111	38 54 8	2122	40 44 33	2136	42 34 38	2149
	Antares	E.	61 25 11	2272	59 38 31	2289	57 52 16	2308	56 6 28	2326
	Saturn	E.	67 46 0	2225	65 58 10	2239	64 10 41	2254	62 23 34	2270
	Venus	E.	100 53 43	2588	99 14 31	2604	97 35 41	2620	95 57 13	2635
	SUN	E.	125 3 53	2507	123 22 50	2523	121 42 9	2538	120 1 49	2554

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.				
Mon.	1	<sup>h</sup> 21 <sup>m</sup> 0 <sup>s</sup> 50.98	10.172	S. 16° 59' 44.5"	42.96	16' 15.95"	68.23	<sup>m</sup> 13 <sup>s</sup> 53.54	0.316	
Tues.	2	21 4 54.73	10.138	16 42 24.3	43.70	16 15.79	68.12	14 0.72	0.282	
Wed.	3	21 8 57.67	10.105	16 24 46.5	44.42	16 15.63	68.00	14 7.09	0.249	
Thur.	4	21 12 59.80	10.072	16 6 51.6	45.12	16 15.46	67.89	14 12.65	0.216	
Frid.	5	21 17 1.12	10.039	15 48 40.0	45.81	16 15.29	67.77	14 17.41	0.183	
Sat.	6	21 21 1.66	10.006	15 30 12.3	46.48	16 15.12	67.66	14 21.39	0.150	
Sun.	7	21 25 1.42	9.973	15 11 28.9	47.13	16 14.94	67.54	14 24.58	0.117	
Mon.	8	21 29 0.39	9.940	14 52 29.9	47.77	16 14.76	67.43	14 26.99	0.084	
Tues.	9	21 32 58.57	9.908	14 33 15.6	48.38	16 14.57	67.31	14 28.61	0.052	
Wed.	10	21 36 55.98	9.876	14 13 46.7	48.98	16 14.38	67.20	14 29.46	0.020	
Thur.	11	21 40 52.61	9.844	13 54 4.0	49.56	16 14.19	67.09	14 29.53	0.012	
Frid.	12	21 44 48.47	9.812	13 34 7.6	50.13	16 14.00	66.98	14 28.84	0.044	
Sat.	13	21 48 43.57	9.781	13 13 57.6	50.67	16 13.80	66.87	14 27.39	0.076	
Sun.	14	21 52 37.93	9.749	12 53 34.8	51.20	16 13.61	66.76	14 25.19	0.107	
Mon.	15	21 56 31.53	9.719	12 32 59.6	51.71	16 13.41	66.66	14 22.25	0.137	
Tues.	16	22 0 24.39	9.688	12 12 12.5	52.20	16 13.21	66.56	14 18.57	0.168	
Wed.	17	22 4 16.51	9.658	11 51 13.8	52.67	16 13.00	66.46	14 14.16	0.198	
Thur.	18	22 8 7.91	9.628	11 30 4.0	53.13	16 12.80	66.36	14 9.02	0.228	
Frid.	19	22 11 58.60	9.599	11 8 43.4	53.57	16 12.59	66.27	14 3.17	0.257	
Sat.	20	22 15 48.62	9.571	10 47 12.5	53.99	16 12.38	66.17	13 56.65	0.285	
Sun.	21	22 19 37.96	9.543	10 25 31.7	54.40	16 12.16	66.08	13 49.46	0.313	
Mon.	22	22 23 26.65	9.516	10 3 41.3	54.79	16 11.94	65.99	13 41.62	0.340	
Tues.	23	22 27 14.69	9.490	9 41 41.9	55.16	16 11.71	65.90	13 33.13	0.366	
Wed.	24	22 31 2.11	9.465	9 19 33.8	55.51	16 11.48	65.81	13 24.02	0.391	
Thur.	25	22 34 48.94	9.440	8 57 17.3	55.85	16 11.25	65.72	13 14.32	0.416	
Frid.	26	22 38 35.18	9.417	8 34 53.0	56.17	16 11.01	65.64	13 4.04	0.439	
Sat.	27	22 42 20.87	9.394	8 12 21.1	56.48	16 10.77	65.56	12 53.21	0.462	
Sun.	28	22 46 6.02	9.372	7 49 42.0	56.77	16 10.53	65.48	12 41.84	0.484	
Mon.	29	22 49 50.67	9.351	S. 7 26 56.1	57.05	16 10.28	65.41	12 29.97	0.504	

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.19 from the Sidereal Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be subtracted from Mean Time.	Diff. for 1 hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.			
Mon.	1	<sup>h</sup> 21 <sup>m</sup> 0 <sup>s</sup> 48.62	10.172	S. 16° 59' 54.5"	42.96	<sup>m</sup> 13 <sup>s</sup> 53.47	0.316	<sup>h</sup> 20 <sup>m</sup> 46 <sup>s</sup> 55.15
Tues.	2	21 4 52.36	10.138	16 42 34.5	43.70	14 0.66	0.282	20 50 51.70
Wed.	3	21 8 55.29	10.105	16 24 57.0	44.42	14 7.03	0.249	20 54 48.26
Thur.	4	21 12 57.41	10.072	16 7 2.3	45.12	14 12.60	0.216	20 58 44.81
Frid.	5	21 16 58.73	10.039	15 48 50.9	45.81	14 17.36	0.183	21 2 41.37
Sat.	6	21 20 59.27	10.006	15 30 23.5	46.48	14 21.35	0.150	21 6 37.92
Sun.	7	21 24 59.03	9.973	15 11 40.3	47.13	14 24.55	0.117	21 10 34.48
Mon.	8	21 28 58.00	9.940	14 52 41.4	47.77	14 26.97	0.084	21 14 31.03
Tues.	9	21 32 56.18	9.908	14 33 27.3	48.38	14 28.60	0.052	21 18 27.58
Wed.	10	21 36 53.59	9.876	14 13 58.6	48.98	14 29.45	0.020	21 22 24.14
Thur.	11	21 40 50.23	9.844	13 54 16.0	49.56	14 29.54	0.012	21 26 20.69
Frid.	12	21 44 46.10	9.812	13 34 19.7	50.13	14 28.85	0.044	21 30 17.25
Sat.	13	21 48 41.21	9.781	13 14 9.8	50.67	14 27.41	0.076	21 34 13.80
Sun.	14	21 52 35.58	9.749	12 53 47.1	51.20	14 25.23	0.107	21 38 10.35
Mon.	15	21 56 29.20	9.719	12 33 12.0	51.71	14 22.29	0.137	21 42 6.91
Tues.	16	22 0 22.08	9.688	12 12 24.9	52.20	14 18.62	0.168	21 46 3.46
Wed.	17	22 4 14.22	9.658	11 51 26.3	52.67	14 14.21	0.198	21 50 0.01
Thur.	18	22 8 5.64	9.628	11 30 16.5	53.13	14 9.07	0.228	21 53 56.57
Frid.	19	22 11 56.35	9.599	11 8 56.0	53.57	14 3.23	0.257	21 57 53.12
Sat.	20	22 15 46.39	9.571	10 47 25.0	53.99	13 56.72	0.285	22 1 49.67
Sun.	21	22 19 35.76	9.543	10 25 44.2	54.40	13 49.53	0.313	22 5 46.23
Mon.	22	22 23 24.48	9.516	10 3 53.8	54.79	13 41.70	0.340	22 9 42.78
Tues.	23	22 27 12.55	9.490	9 41 54.3	55.16	13 33.22	0.366	22 13 39.33
Wed.	24	22 31 0.00	9.465	9 19 46.2	55.51	13 24.11	0.391	22 17 35.89
Thur.	25	22 34 46.86	9.440	8 57 29.7	55.85	13 14.42	0.416	22 21 32.44
Frid.	26	22 38 33.13	9.417	8 35 5.3	56.17	13 4.14	0.439	22 25 28.99
Sat.	27	22 42 18.85	9.394	8 12 33.2	56.48	12 53.31	0.462	22 29 25.54
Sun.	28	22 46 4.04	9.372	7 49 54.0	56.77	12 41.94	0.484	22 33 22.10
Mon.	29	22 49 48.72	9.351	S. 7 27 8.0	57.05	12 30.07	0.504	22 37 18.65

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+9°.8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S					Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE				
		$\lambda$	$\lambda'$						
1	32	312° 44' 24.5"	44' 30.8"	152.11	+0.31	9.9937467	29.0	3 <sup>h</sup> 12 <sup>m</sup> 33.22 <sup>s</sup>	
2	33	313 45 14.7	45 20.9	152.07	0.38	.9938175	29.9	3 8 37.31	
3	34	314 46 4.0	46 10.1	152.03	0.42	.9938904	30.7	3 4 41.40	
4	35	315 46 52.3	46 58.3	151.99	0.42	.9939652	31.5	3 0 45.49	
5	36	316 47 39.7	47 45.5	151.95	0.39	.9940419	32.2	2 56 49.59	
6	37	317 48 26.1	48 31.8	151.91	0.34	.9941202	32.9	2 52 53.68	
7	38	318 49 11.5	49 17.1	151.87	0.27	.9942000	33.5	2 48 57.77	
8	39	319 49 55.8	50 1.3	151.83	0.17	.9942812	34.1	2 45 1.86	
9	40	320 50 39.0	50 44.4	151.78	+0.05	.9943636	34.6	2 41 5.95	
10	41	321 51 21.0	51 26.3	151.73	-0.09	.9944472	35.1	2 37 10.05	
11	42	322 52 1.7	52 6.8	151.67	0.22	.9945318	35.4	2 33 14.14	
12	43	323 52 40.9	52 45.9	151.61	0.35	.9946174	35.9	2 29 18.23	
13	44	324 53 18.5	53 23.4	151.54	0.46	.9947041	36.3	2 25 22.33	
14	45	325 53 54.5	53 59.3	151.47	0.56	.9947918	36.7	2 21 26.42	
15	46	326 54 28.9	54 33.6	151.40	0.65	.9948806	37.2	2 17 30.51	
16	47	327 55 1.5	55 6.1	151.33	0.71	.9949705	37.7	2 13 34.60	
17	48	328 55 32.3	55 36.8	151.25	0.74	.9950615	38.2	2 9 38.69	
18	49	329 56 1.2	56 5.6	151.17	0.74	.9951538	38.7	2 5 42.78	
19	50	330 56 28.2	56 32.5	151.09	0.71	.9952475	39.3	2 1 46.87	
20	51	331 56 53.4	56 57.6	151.01	0.63	.9953426	39.9	1 57 50.96	
21	52	332 57 16.7	57 20.8	150.93	0.54	.9954393	40.6	1 53 55.05	
22	53	333 57 38.0	57 42.0	150.85	0.44	.9955377	41.3	1 49 59.15	
23	54	334 57 57.4	58 1.3	150.77	0.32	.9956378	42.0	1 46 3.24	
24	55	335 58 14.9	58 18.7	150.69	0.18	.9957396	42.7	1 42 7.33	
25	56	336 58 30.6	58 34.3	150.62	-0.04	.9958433	43.5	1 38 11.43	
26	57	337 58 44.5	58 48.1	150.54	+0.09	.9959487	44.2	1 34 15.52	
27	58	338 58 56.6	59 0.1	150.47	0.20	.9960559	45.0	1 30 19.61	
28	59	339 59 6.9	59 10.3	150.40	0.30	.9961650	45.7	1 26 23.71	
29	60	340 59 15.6	59 18.9	150.33	+0.38	9.9962757	46.3	1 22 27.80	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>h</sup> .830	



GREENWICH MEAN TIME.									
Day of the Month.	THE MOON'S								
	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
1	16' 15.9	16' 9.4	59' 35.2	-1.94	59' 11.3	-2.03	<sup>h</sup> 16 <sup>m</sup> 47.2	<sup>m</sup> 2.13	<sup>d</sup> 19.7
2	16 2.7	15 55.9	58 46.6	2.07	58 21.6	2.07	17 37.8	2.10	20.7
3	15 49.1	15 42.5	57 56.8	2.04	57 32.6	1.98	18 28.1	2.10	21.7
4	15 36.2	15 30.2	57 9.3	1.89	56 47.2	1.79	19 18.5	2.10	22.7
5	15 24.5	15 19.2	56 26.3	1.68	56 6.9	1.56	20 9.0	2.10	23.7
6	15 13.3	15 9.8	55 48.8	1.44	55 32.3	1.32	20 59.5	2.09	24.7
7	15 5.6	15 1.9	55 17.1	1.20	55 3.4	1.09	21 49.5	2.06	25.7
8	14 58.6	14 55.6	54 51.0	0.97	54 40.0	0.86	22 38.5	2.01	26.7
9	14 52.9	14 50.6	54 30.3	0.75	54 22.0	0.64	23 26.1	1.95	27.7
10	14 48.7	14 47.1	54 14.8	0.55	54 8.8	0.45	δ		28.7
11	14 45.8	14 44.8	54 4.0	0.35	54 0.4	0.25	0 12.2	1.88	29.7
12	14 44.1	14 43.8	53 58.0	-0.15	53 56.8	-0.04	0 56.6	1.82	0.9
13	14 43.8	14 44.4	53 57.0	+0.09	53 58.9	+0.22	1 39.7	1.78	1.9
14	14 45.3	14 46.6	54 2.3	0.35	54 7.3	0.49	2 21.9	1.75	2.9
15	14 48.5	14 50.8	54 14.0	0.64	54 22.6	0.80	3 3.9	1.76	3.9
16	14 53.7	14 57.1	54 33.2	0.97	54 45.9	1.14	3 46.2	1.79	4.9
17	15 1.1	15 5.7	55 0.6	1.31	55 17.4	1.49	4 29.8	1.86	5.9
18	15 10.9	15 16.6	55 36.3	1.66	55 57.3	1.83	5 15.4	1.95	6.9
19	15 22.9	15 29.6	56 20.3	2.00	56 45.2	2.14	6 3.6	2.08	7.9
20	15 36.9	15 44.4	57 11.7	2.26	57 39.5	2.36	6 55.1	2.21	8.9
21	15 52.3	16 0.2	58 8.2	2.41	58 37.4	2.42	7 49.9	2.35	9.9
22	16 8.1	16 15.8	59 6.4	2.38	59 34.5	2.28	8 47.8	2.45	10.9
23	16 23.0	16 29.6	60 1.1	2.12	60 25.4	1.89	9 47.6	2.50	11.9
24	16 35.4	16 40.1	60 46.6	1.61	61 4.0	1.27	10 47.8	2.49	12.9
25	16 43.6	16 45.9	61 17.0	0.89	61 25.2	+0.47	11 47.3	2.44	13.9
26	16 46.8	16 46.2	61 28.4	+0.05	61 26.4	-0.38	12 45.1	2.37	14.9
27	16 44.3	16 41.0	61 19.3	-0.80	61 7.4	1.18	13 41.0	2.30	15.9
28	16 36.6	16 31.1	60 51.0	1.52	60 30.8	1.81	14 35.3	2.24	16.9
29	16 24.7	16 17.7	60 7.4	2.05	59 41.6	2.22	15 28.4	2.20	17.9
30	16 10.2	16 2.4	59 14.1	2.33	58 45.7	2.38	16 20.8	2.18	18.9
31	15 54.6	15 46.9	58 16.9	2.39	57 48.4	2.34	17 12.8	2.16	19.9
32	15 39.3	15 32.1	57 20.6	-2.26	56 54.1	-2.15	18 4.6	2.15	20.9

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 1.					WEDNESDAY 3.				
0	12 59 29.15	2.2448	S. 1° 30' 27.5"	12.150	0	14 45 32.57	2.1897	S. 10° 28' 1.6"	9.889
1	13 1 43.78	2.2437	1 42 35.8	12.137	1	14 47 43.94	2.1894	10 37 52.9	9.821
2	13 3 58.28	2.2406	1 54 42.7	12.102	2	14 49 55.30	2.1892	10 47 40.1	9.752
3	13 6 12.65	2.2385	2 6 48.1	12.076	3	14 52 6.65	2.1890	10 57 23.1	9.682
4	13 8 26.90	2.2365	2 18 51.9	12.049	4	14 54 17.99	2.1889	11 7 1.9	9.612
5	13 10 41.03	2.2345	2 30 54.0	12.022	5	14 56 29.31	2.1887	11 16 36.5	9.541
6	13 12 55.04	2.2326	2 42 54.5	11.993	6	14 58 40.63	2.1886	11 26 6.9	9.470
7	13 15 8.94	2.2307	2 54 53.2	11.963	7	15 0 51.94	2.1885	11 35 32.9	9.397
8	13 17 22.73	2.2289	3 6 50.0	11.931	8	15 3 3.26	2.1884	11 44 54.6	9.324
9	13 19 36.41	2.2271	3 18 44.9	11.899	9	15 5 14.57	2.1884	11 54 11.9	9.251
10	13 21 49.99	2.2254	3 30 37.8	11.866	10	15 7 25.87	2.1884	12 3 24.7	9.176
11	13 24 3.46	2.2237	3 42 28.7	11.831	11	15 9 37.17	2.1884	12 12 33.1	9.101
12	13 26 16.83	2.2220	3 54 17.5	11.795	12	15 11 48.47	2.1884	12 21 36.9	9.026
13	13 28 30.10	2.2204	4 6 4.1	11.758	13	15 13 59.77	2.1884	12 30 36.2	8.950
14	13 30 43.28	2.2188	4 17 48.5	11.721	14	15 16 11.08	2.1885	12 39 31.0	8.874
15	13 32 56.36	2.2173	4 29 30.6	11.682	15	15 18 22.39	2.1886	12 48 21.1	8.796
16	13 35 9.35	2.2158	4 41 10.3	11.642	16	15 20 33.71	2.1887	12 57 6.5	8.718
17	13 37 22.26	2.2144	4 52 47.6	11.601	17	15 22 45.03	2.1888	13 5 47.3	8.640
18	13 39 35.08	2.2130	5 4 22.5	11.560	18	15 24 56.36	2.1889	13 14 23.4	8.561
19	13 41 47.82	2.2117	5 15 54.8	11.517	19	15 27 7.70	2.1890	13 22 54.7	8.481
20	13 44 0.48	2.2104	5 27 24.5	11.473	20	15 29 19.05	2.1892	13 31 21.2	8.401
21	13 46 13.07	2.2091	5 38 51.6	11.429	21	15 31 30.41	2.1894	13 39 42.8	8.320
22	13 48 25.58	2.2079	5 50 16.0	11.383	22	15 33 41.78	2.1896	13 47 59.6	8.239
23	13 50 38.02	2.2067	S. 6 1 37.6	11.336	23	15 35 53.16	2.1898	S. 13 56 11.5	8.157
TUESDAY 2.					THURSDAY 4.				
0	13 52 50.39	2.2056	S. 6 12 56.4	11.289	0	15 38 4.55	2.1900	S. 14 4 18.5	8.075
1	13 55 2.69	2.2045	6 24 12.3	11.240	1	15 40 15.96	2.1902	14 12 20.5	7.992
2	13 57 14.93	2.2035	6 35 25.2	11.191	2	15 42 27.38	2.1905	14 20 17.5	7.908
3	13 59 27.11	2.2025	6 46 35.2	11.141	3	15 44 38.82	2.1907	14 28 9.5	7.824
4	14 1 39.23	2.2015	6 57 42.1	11.090	4	15 46 50.27	2.1910	14 35 56.4	7.740
5	14 3 51.29	2.2006	7 8 45.9	11.037	5	15 49 1.74	2.1912	14 43 38.3	7.655
6	14 6 3.30	2.1997	7 19 46.6	10.984	6	15 51 13.22	2.1915	14 51 15.0	7.569
7	14 8 15.25	2.1988	7 30 44.1	10.931	7	15 53 24.72	2.1918	14 58 46.6	7.483
8	14 10 27.15	2.1980	7 41 38.3	10.876	8	15 55 36.23	2.1921	15 6 13.0	7.397
9	14 12 39.01	2.1972	7 52 29.2	10.820	9	15 57 47.76	2.1924	15 13 34.2	7.310
10	14 14 50.82	2.1965	8 3 16.7	10.763	10	15 59 59.31	2.1927	15 20 50.2	7.222
11	14 17 2.59	2.1958	8 14 0.8	10.706	11	16 2 10.88	2.1930	15 28 0.9	7.134
12	14 19 14.31	2.1951	8 24 41.5	10.648	12	16 4 22.46	2.1932	15 35 6.3	7.046
13	14 21 26.00	2.1945	8 35 18.6	10.589	13	16 6 34.06	2.1935	15 42 6.4	6.957
14	14 23 37.65	2.1939	8 45 52.2	10.529	14	16 8 45.68	2.1938	15 49 1.1	6.867
15	14 25 49.27	2.1933	8 56 22.2	10.463	15	16 10 57.32	2.1941	15 55 50.5	6.778
16	14 28 0.85	2.1928	9 6 48.5	10.407	16	16 13 8.98	2.1944	16 2 34.5	6.688
17	14 30 12.40	2.1923	9 17 11.1	10.345	17	16 15 20.65	2.1947	16 9 13.1	6.598
18	14 32 23.92	2.1918	9 27 29.9	10.282	18	16 17 32.34	2.1950	16 15 46.2	6.507
19	14 34 35.42	2.1914	9 37 45.0	10.219	19	16 19 44.05	2.1952	16 22 13.9	6.415
20	14 36 46.89	2.1910	9 47 56.2	10.154	20	16 21 55.77	2.1955	16 28 36.1	6.324
21	14 38 58.34	2.1906	9 58 3.5	10.089	21	16 24 7.51	2.1958	16 34 52.8	6.232
22	14 41 9.77	2.1903	10 8 6.9	10.023	22	16 26 19.27	2.1961	16 41 3.9	6.140
23	14 43 21.18	2.1900	10 18 6.3	9.956	23	16 28 31.04	2.1963	16 47 9.5	6.047
24	14 45 32.57	2.1897	S. 10 28 1.6	9.889	24	16 30 42.83	2.1966	S. 16 53 9.5	5.953

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 5.					SUNDAY 7.				
0	h m s	"	S. 16° 53' 9.5"	5.953	0	h m s	"	S. 19° 46' 44.5"	1.221
1	16 30 42.83	2.1966	16 59 3.9	5.860	1	18 16 9.12	2.1878	19 47 54.7	1.190
2	16 32 54.63	2.1969	17 4 52.7	5.766	2	18 18 20.36	2.1869	19 48 58.9	1.090
3	16 35 6.45	2.1971	17 10 35.8	5.672	3	18 20 31.55	2.1860	19 49 57.1	0.990
4	16 37 18.28	2.1973	17 16 13.3	5.577	4	18 22 42.69	2.1851	19 50 49.3	0.819
5	16 39 30.13	2.1976	17 21 45.1	5.482	5	18 24 53.77	2.1842	19 51 35.5	0.719
6	16 41 41.99	2.1978	17 27 11.2	5.387	6	18 27 4.79	2.1832	19 52 15.6	0.619
7	16 43 53.86	2.1980	17 32 31.6	5.292	7	18 29 15.75	2.1822	19 52 49.7	0.519
8	16 46 5.74	2.1982	17 37 46.3	5.196	8	18 31 26.65	2.1812	19 53 17.9	0.419
9	16 48 17.64	2.1983	17 42 55.2	5.100	9	18 33 37.49	2.1801	19 53 40.1	0.319
10	16 50 29.55	2.1985	17 47 58.3	5.004	10	18 35 48.27	2.1790	19 53 56.3	0.220
11	16 52 41.47	2.1987	17 52 55.7	4.907	11	18 37 58.98	2.1779	19 54 6.5	0.120
12	16 54 53.39	2.1988	17 57 47.2	4.810	12	18 40 9.62	2.1767	19 54 10.7	0.021
13	16 57 5.32	2.1989	18 2 32.9	4.713	13	18 42 20.19	2.1755	19 54 1.3	0.078
14	16 59 17.26	2.1991	18 7 12.8	4.616	14	18 44 30.68	2.1743	19 54 1.3	0.177
15	17 1 29.21	2.1992	18 11 46.8	4.518	15	18 46 41.10	2.1730	19 53 2.8	0.276
16	17 3 41.16	2.1992	18 16 15.0	4.420	16	18 48 51.44	2.1717	19 53 28.2	0.374
17	17 5 53.12	2.1993	18 20 37.3	4.322	17	18 51 1.70	2.1704	19 53 2.8	0.473
18	17 8 5.07	2.1993	18 24 53.7	4.224	18	18 53 11.88	2.1690	19 52 31.5	0.570
19	17 10 17.03	2.1993	18 29 4.2	4.126	19	18 55 21.98	2.1676	19 51 54.3	0.668
20	17 12 28.99	2.1993	18 33 8.8	4.027	20	18 57 32.00	2.1662	19 51 11.3	0.766
21	17 14 40.94	2.1992	18 37 7.5	3.928	21	18 59 41.93	2.1647	19 50 22.4	0.863
22	17 16 52.89	2.1992	18 41 0.2	3.829	22	19 1 51.77	2.1632	19 49 27.7	0.961
23	17 19 4.84	2.1991	S. 18 44 47.0	3.730	23	19 4 1.52	2.1617	S. 19 48 27.1	1.058
24	17 21 16.78	2.1990				19 6 11.18	2.1601		
SATURDAY 6.					MONDAY 8.				
0	17 23 28.72	2.1989	S. 18 48 27.8	3.630	0	19 8 20.74	2.1585	S. 19 47 20.8	1.155
1	17 25 40.65	2.1987	18 52 2.6	3.531	1	19 10 30.20	2.1569	19 46 8.6	1.251
2	17 27 52.57	2.1986	18 55 31.5	3.431	2	19 12 39.57	2.1553	19 44 50.7	1.347
3	17 30 4.48	2.1984	18 58 54.4	3.331	3	19 14 48.84	2.1536	19 43 27.0	1.443
4	17 32 16.37	2.1982	19 2 11.3	3.232	4	19 16 58.00	2.1519	19 41 57.5	1.539
5	17 34 28.25	2.1979	19 5 22.2	3.133	5	19 19 7.06	2.1501	19 40 22.3	1.634
6	17 36 40.12	2.1977	19 8 27.1	3.032	6	19 21 16.01	2.1484	19 38 41.4	1.729
7	17 38 51.97	2.1974	19 11 26.0	2.931	7	19 23 24.86	2.1466	19 36 54.8	1.824
8	17 41 3.80	2.1970	19 14 18.9	2.831	8	19 25 33.60	2.1447	19 35 2.6	1.918
9	17 43 15.61	2.1967	19 17 5.8	2.731	9	19 27 42.23	2.1429	19 33 4.7	2.012
10	17 45 27.40	2.1963	19 19 46.7	2.631	10	19 29 50.75	2.1410	19 31 1.2	2.106
11	17 47 39.17	2.1959	19 22 21.5	2.530	11	19 31 59.15	2.1391	19 28 52.0	2.199
12	17 49 50.91	2.1954	19 24 50.3	2.429	12	19 34 7.44	2.1371	19 26 37.2	2.292
13	17 52 2.62	2.1949	19 27 13.0	2.329	13	19 36 15.61	2.1351	19 24 16.9	2.385
14	17 54 14.30	2.1944	19 29 29.7	2.228	14	19 38 23.66	2.1331	19 21 51.0	2.477
15	17 56 25.95	2.1939	19 31 40.4	2.127	15	19 40 31.58	2.1311	19 19 19.6	2.569
16	17 58 37.57	2.1934	19 33 45.0	2.027	16	19 42 39.38	2.1291	19 16 42.7	2.661
17	18 0 49.15	2.1928	19 35 43.6	1.926	17	19 44 47.06	2.1270	19 14 0.3	2.752
18	18 3 0.70	2.1922	19 37 36.1	1.825	18	19 46 54.62	2.1249	19 11 12.5	2.843
19	18 5 12.21	2.1915	19 39 22.6	1.725	19	19 49 2.05	2.1228	19 8 19.2	2.933
20	18 7 23.68	2.1908	19 41 3.1	1.624	20	19 51 9.35	2.1206	19 5 20.5	3.023
21	18 9 35.11	2.1901	19 42 37.5	1.523	21	19 53 16.52	2.1184	19 2 16.4	3.113
22	18 11 46.49	2.1894	19 44 5.9	1.423	22	19 55 23.56	2.1162	18 59 7.0	3.202
23	18 13 57.83	2.1886	19 45 28.2	1.322	23	19 57 30.47	2.1140	18 55 52.2	3.290
24	18 16 9.12	2.1878	S. 19 46 44.5	1.221	24	19 59 37.25	2.1118	S. 18 52 32.1	3.379

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 9.					THURSDAY 11.				
0	19 59 37.25	2.1118	S. 18° 52' 32.1"	3.379	0	21 38 8.15	1.9906	S. 14° 38' 6.0"	7.012
1	20 1 43.89	2.1095	18 49 6.7	3.467	1	21 40 7.51	1.9881	14 31 3.4	7.073
2	20 3 50.39	2.1072	18 45 36.1	3.554	2	21 42 6.72	1.9855	14 23 57.2	7.134
3	20 5 56.76	2.1049	18 42 0.2	3.641	3	21 44 5.77	1.9830	14 16 47.3	7.195
4	20 8 2.99	2.1026	18 38 19.1	3.728	4	21 46 4.68	1.9805	14 9 33.8	7.255
5	20 10 9.07	2.1003	18 34 32.9	3.814	5	21 48 3.43	1.9780	14 2 16.7	7.314
6	20 12 15.02	2.0980	18 30 41.5	3.899	6	21 50 2.03	1.9755	13 54 56.1	7.372
7	20 14 20.83	2.0956	18 26 45.0	3.984	7	21 52 0.49	1.9730	13 47 32.0	7.430
8	20 16 26.49	2.0932	18 22 43.4	4.069	8	21 53 58.80	1.9706	13 40 4.5	7.488
9	20 18 32.01	2.0908	18 18 36.8	4.152	9	21 55 56.96	1.9681	13 32 33.5	7.545
10	20 20 37.38	2.0884	18 14 25.1	4.236	10	21 57 54.97	1.9657	13 24 59.1	7.601
11	20 22 42.61	2.0859	18 10 8.4	4.320	11	21 59 52.84	1.9633	13 17 21.4	7.656
12	20 24 47.69	2.0834	18 5 46.7	4.403	12	22 1 50.57	1.9609	13 9 40.4	7.711
13	20 26 52.62	2.0810	18 1 20.1	4.485	13	22 3 48.15	1.9585	13 1 56.1	7.765
14	20 28 57.40	2.0785	17 56 48.6	4.566	14	22 5 45.59	1.9561	12 54 8.6	7.819
15	20 31 2.04	2.0760	17 52 12.2	4.647	15	22 7 42.89	1.9538	12 46 17.9	7.872
16	20 33 6.52	2.0734	17 47 30.9	4.728	16	22 9 40.04	1.9514	12 38 24.0	7.924
17	20 35 10.85	2.0709	17 42 44.8	4.808	17	22 11 37.06	1.9491	12 30 27.0	7.976
18	20 37 15.02	2.0684	17 37 54.0	4.887	18	22 13 33.94	1.9469	12 22 26.9	8.027
19	20 39 19.05	2.0658	17 32 58.4	4.966	19	22 15 30.68	1.9446	12 14 23.8	8.077
20	20 41 22.92	2.0633	17 27 58.0	5.045	20	22 17 27.29	1.9423	12 6 17.7	8.127
21	20 43 26.64	2.0607	17 22 53.0	5.123	21	22 19 23.76	1.9401	11 58 8.6	8.176
22	20 45 30.21	2.0581	17 17 43.3	5.200	22	22 21 20.10	1.9379	11 49 56.5	8.225
23	20 47 33.62	2.0555	S. 17° 12' 29.0"	5.277	23	22 23 16.31	1.9357	S. 11° 41' 41.5"	8.273
WEDNESDAY 10.					FRIDAY 12.				
0	20 49 36.88	2.0530	S. 17° 7' 10.0"	5.354	0	22 25 12.39	1.9336	S. 11° 33' 23.7"	8.321
1	20 51 39.98	2.0504	17 1 46.5	5.429	1	22 27 8.34	1.9315	11 25 3.0	8.368
2	20 53 42.93	2.0478	16 56 18.5	5.504	2	22 29 4.16	1.9293	11 16 39.6	8.414
3	20 55 45.72	2.0452	16 50 46.0	5.579	3	22 30 59.86	1.9272	11 8 13.4	8.459
4	20 57 48.35	2.0426	16 45 9.0	5.653	4	22 32 55.43	1.9251	10 59 44.5	8.504
5	20 59 50.83	2.0400	16 39 27.6	5.727	5	22 34 50.88	1.9231	10 51 12.9	8.548
6	21 1 53.15	2.0374	16 33 41.8	5.800	6	22 36 46.20	1.9211	10 42 38.7	8.592
7	21 3 55.31	2.0348	16 27 51.6	5.872	7	22 38 41.40	1.9191	10 34 1.9	8.635
8	21 5 57.32	2.0322	16 21 57.1	5.944	8	22 40 36.49	1.9171	10 25 22.5	8.677
9	21 7 59.17	2.0295	16 15 58.3	6.015	9	22 42 31.46	1.9152	10 16 40.6	8.719
10	21 10 0.86	2.0269	16 9 55.3	6.086	10	22 44 26.31	1.9133	10 7 56.2	8.760
11	21 12 2.40	2.0243	16 3 48.0	6.156	11	22 46 21.05	1.9114	9 59 9.4	8.801
12	21 14 3.78	2.0217	15 57 36.6	6.225	12	22 48 15.67	1.9096	9 50 20.2	8.841
13	21 16 5.00	2.0191	15 51 21.1	6.294	13	22 50 10.19	1.9077	9 41 28.6	8.880
14	21 18 6.06	2.0164	15 45 1.4	6.362	14	22 52 4.60	1.9059	9 32 34.6	8.919
15	21 20 6.97	2.0138	15 38 37.6	6.430	15	22 53 58.90	1.9041	9 23 38.3	8.957
16	21 22 7.72	2.0112	15 32 9.8	6.497	16	22 55 53.10	1.9024	9 14 39.8	8.994
17	21 24 8.32	2.0086	15 25 38.0	6.563	17	22 57 47.19	1.9007	9 5 39.0	9.031
18	21 26 8.76	2.0060	15 19 2.2	6.629	18	22 59 41.18	1.8991	8 56 36.0	9.067
19	21 28 9.04	2.0035	15 12 22.5	6.695	19	23 1 35.07	1.8974	8 47 30.9	9.103
20	21 30 9.17	2.0009	15 5 38.9	6.760	20	23 3 28.87	1.8958	8 38 23.7	9.138
21	21 32 9.15	1.9983	14 58 51.4	6.824	21	23 5 22.57	1.8942	8 29 14.4	9.172
22	21 34 8.97	1.9957	14 52 0.0	6.887	22	23 7 16.18	1.8927	8 20 3.0	9.206
23	21 36 8.64	1.9932	14 45 4.9	6.950	23	23 9 9.69	1.8912	8 10 49.6	9.239
24	21 38 8.15	1.9906	S. 14° 38' 6.0"	7.012	24	23 11 3.11	1.8898	S. 8° 1' 34.3"	9.272

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 13.					MONDAY 15.				
0	<sup>h</sup> 23 <sup>m</sup> 11 <sup>s</sup> 3.11	1.8698	S. 8° 1' 34.3"	9.279	0	<sup>h</sup> 0 40 46.33	1.8646	S. 0° 10' 24.7"	10.133
1	23 12 56.45	1.8683	7 52 17.0	9.304	1	0 42 38.22	1.8652	S. 0 0 16.6	10.136
2	23 14 49.70	1.8669	7 42 57.8	9.335	2	0 44 30.15	1.8658	N. 0 9 51.7	10.139
3	23 16 42.87	1.8655	7 33 36.8	9.366	3	0 46 22.11	1.8664	0 20 0.1	10.141
4	23 18 35.96	1.8641	7 24 13.9	9.396	4	0 48 14.11	1.8671	0 30 8.6	10.143
5	23 20 28.97	1.8628	7 14 49.3	9.425	5	0 50 6.16	1.8678	0 40 17.2	10.144
6	23 22 21.90	1.8615	7 5 22.9	9.454	6	0 51 58.25	1.8686	0 50 25.9	10.144
7	23 24 14.76	1.8603	6 55 54.8	9.483	7	0 53 50.39	1.8694	1 0 34.6	10.144
8	23 26 7.54	1.8791	6 46 25.0	9.511	8	0 55 42.58	1.8703	1 10 43.2	10.143
9	23 28 0.25	1.8779	6 36 53.6	9.538	9	0 57 34.83	1.8712	1 20 51.8	10.142
10	23 29 52.89	1.8768	6 27 20.5	9.564	10	0 59 27.13	1.8722	1 31 0.3	10.140
11	23 31 45.46	1.8757	6 17 45.9	9.590	11	1 1 19.49	1.8732	1 41 8.7	10.138
12	23 33 37.97	1.8747	6 8 9.7	9.615	12	1 3 11.92	1.8743	1 51 16.9	10.135
13	23 35 30.42	1.8737	5 58 32.0	9.640	13	1 5 4.41	1.8755	2 1 24.9	10.131
14	23 37 22.81	1.8727	5 48 52.9	9.664	14	1 6 56.97	1.8766	2 11 32.6	10.127
15	23 39 15.14	1.8718	5 39 12.3	9.687	15	1 8 49.60	1.8778	2 21 40.1	10.122
16	23 41 7.42	1.8709	5 29 30.4	9.710	16	1 10 42.31	1.8792	2 31 47.3	10.116
17	23 42 59.65	1.8700	5 19 47.1	9.733	17	1 12 35.10	1.8804	2 41 54.1	10.110
18	23 44 51.83	1.8692	5 10 2.5	9.755	18	1 14 27.96	1.8818	2 52 0.5	10.103
19	23 46 43.96	1.8684	5 0 16.6	9.776	19	1 16 20.91	1.8832	3 2 6.5	10.096
20	23 48 36.04	1.8677	4 50 29.4	9.796	20	1 18 13.95	1.8847	3 12 12.0	10.088
21	23 50 28.08	1.8670	4 40 41.0	9.816	21	1 20 7.08	1.8862	3 22 17.1	10.079
22	23 52 20.06	1.8664	4 30 51.5	9.835	22	1 22 0.30	1.8878	3 32 21.6	10.070
23	23 54 12.04	1.8658	S. 4 21 0.8	9.854	23	1 23 53.61	1.8894	N. 3 42 25.6	10.061
SUNDAY 14.					TUESDAY 16.				
0	23 56 3.97	1.8650	S. 4 11 9.0	9.873	0	1 25 47.02	1.8911	N. 3 52 28.9	10.051
1	23 57 55.86	1.8646	4 1 16.1	9.890	1	1 27 40.54	1.8928	4 2 31.6	10.040
2	23 59 47.72	1.8641	3 51 22.2	9.907	2	1 29 34.16	1.8946	4 12 33.7	10.028
3	0 1 39.56	1.8637	3 41 27.3	9.923	3	1 31 27.89	1.8964	4 22 35.0	10.016
4	0 3 31.37	1.8633	3 31 31.4	9.939	4	1 33 21.73	1.8983	4 32 35.6	10.003
5	0 5 23.16	1.8630	3 21 34.5	9.954	5	1 35 15.68	1.9002	4 42 35.4	9.989
6	0 7 14.93	1.8627	3 11 36.8	9.969	6	1 37 9.75	1.9022	4 52 34.3	9.975
7	0 9 6.68	1.8624	3 1 38.2	9.983	7	1 39 3.94	1.9042	5 2 32.4	9.961
8	0 10 58.42	1.8622	2 51 38.8	9.996	8	1 40 58.25	1.9063	5 12 29.6	9.945
9	0 12 50.14	1.8620	2 41 38.6	10.009	9	1 42 52.69	1.9084	5 22 25.9	9.929
10	0 14 41.86	1.8618	2 31 37.7	10.022	10	1 44 47.26	1.9106	5 32 21.1	9.912
11	0 16 33.57	1.8617	2 21 36.0	10.034	11	1 46 41.96	1.9128	5 42 15.3	9.895
12	0 18 25.27	1.8617	2 11 33.7	10.045	12	1 48 36.79	1.9151	5 52 8.5	9.878
13	0 20 16.97	1.8617	2 1 30.7	10.055	13	1 50 31.76	1.9174	6 2 0.6	9.859
14	0 22 8.67	1.8617	1 51 27.1	10.065	14	1 52 26.87	1.9198	6 11 51.6	9.840
15	0 24 0.38	1.8618	1 41 22.9	10.074	15	1 54 22.13	1.9222	6 21 41.4	9.820
16	0 25 52.09	1.8619	1 31 18.2	10.083	16	1 56 17.54	1.9247	6 31 29.9	9.800
17	0 27 43.81	1.8621	1 21 12.9	10.091	17	1 58 13.09	1.9272	6 41 17.2	9.779
18	0 29 35.54	1.8623	1 11 7.2	10.099	18	2 0 8.80	1.9298	6 51 3.2	9.756
19	0 31 27.29	1.8626	1 1 1.0	10.106	19	2 2 4.67	1.9324	7 0 47.8	9.733
20	0 33 19.05	1.8629	0 50 54.4	10.113	20	2 4 0.70	1.9351	7 10 31.1	9.710
21	0 35 10.83	1.8632	0 40 47.5	10.118	21	2 5 56.89	1.9378	7 20 12.9	9.686
22	0 37 2.64	1.8636	0 30 40.2	10.124	22	2 7 53.24	1.9406	7 29 53.3	9.661
23	0 38 54.47	1.8641	0 20 32.6	10.129	23	2 9 49.76	1.9435	7 39 32.2	9.636
24	0 40 46.33	1.8646	S. 0 10 24.7	10.133	24	2 11 46.45	1.9463	N. 7 49 9.5	9.610

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 17.					FRIDAY 19.				
0	2 11 46.45	1.9463	N. 7° 49' 9.5"	9.610	0	3 49 25.44	2.1391	N. 14° 46' 15.1"	7.460
1	2 13 43.32	1.9493	7 58 45.3	9.582	1	3 51 33.94	2.1441	14 53 40.8	7.395
2	2 15 40.36	1.9523	8 8 19.4	9.555	2	3 53 42.73	2.1490	15 1 2.5	7.329
3	2 17 37.59	1.9553	8 17 51.9	9.527	3	3 55 51.83	2.1541	15 8 20.2	7.261
4	2 19 35.00	1.9584	8 27 22.7	9.498	4	3 58 1.23	2.1592	15 15 33.9	7.193
5	2 21 32.59	1.9615	8 36 51.7	9.469	5	4 0 10.93	2.1643	15 22 43.4	7.124
6	2 23 30.37	1.9647	8 46 18.9	9.439	6	4 2 20.94	2.1694	15 29 48.7	7.053
7	2 25 28.35	1.9679	8 55 44.3	9.408	7	4 4 31.26	2.1745	15 36 49.8	6.982
8	2 27 26.52	1.9712	9 5 7.8	9.376	8	4 6 41.88	2.1796	15 43 46.6	6.910
9	2 29 24.89	1.9745	9 14 29.4	9.343	9	4 8 52.81	2.1848	15 50 39.0	6.837
10	2 31 23.46	1.9779	9 23 49.0	9.310	10	4 11 4.06	2.1900	15 57 27.0	6.763
11	2 33 22.24	1.9813	9 33 6.6	9.276	11	4 13 15.62	2.1953	16 4 10.5	6.688
12	2 35 21.22	1.9848	9 42 22.2	9.242	12	4 15 27.49	2.2005	16 10 49.5	6.612
13	2 37 20.41	1.9883	9 51 35.7	9.207	13	4 17 39.68	2.2058	16 17 24.0	6.535
14	2 39 19.82	1.9919	10 0 47.0	9.170	14	4 19 52.19	2.2111	16 23 53.8	6.458
15	2 41 19.44	1.9955	10 9 56.1	9.133	15	4 22 5.01	2.2164	16 30 18.9	6.379
16	2 43 19.28	1.9992	10 19 3.0	9.096	16	4 24 18.15	2.2217	16 36 39.2	6.299
17	2 45 19.34	2.0029	10 28 7.6	9.057	17	4 26 31.61	2.2270	16 42 54.7	6.218
18	2 47 19.63	2.0066	10 37 9.9	9.018	18	4 28 45.39	2.2323	16 49 5.4	6.136
19	2 49 20.14	2.0105	10 46 9.8	8.978	19	4 30 59.49	2.2376	16 55 11.1	6.053
20	2 51 20.88	2.0143	10 55 7.2	8.937	20	4 33 13.91	2.2430	17 1 11.8	5.970
21	2 53 21.85	2.0182	11 4 2.2	8.895	21	4 35 28.65	2.2484	17 7 7.5	5.885
22	2 55 23.06	2.0221	11 12 54.6	8.853	22	4 37 43.71	2.2537	17 12 58.0	5.799
23	2 57 24.51	2.0261	N. 11° 21' 44.5"	8.810	23	4 39 59.10	2.2591	N. 17° 18' 43.3"	5.712
THURSDAY 18.					SATURDAY 20.				
0	2 59 26.20	2.0302	N. 11° 30' 31.8"	8.766	0	4 42 14.81	2.2646	N. 17° 24' 23.4"	5.624
1	3 1 28.13	2.0343	11 39 16.5	8.721	1	4 44 30.84	2.2699	17 29 58.2	5.535
2	3 3 30.31	2.0384	11 47 58.4	8.676	2	4 46 47.19	2.2753	17 35 27.7	5.446
3	3 5 32.75	2.0425	11 56 37.6	8.630	3	4 49 3.87	2.2806	17 40 51.7	5.355
4	3 7 35.43	2.0467	12 5 14.0	8.582	4	4 51 20.87	2.2860	17 46 10.3	5.263
5	3 9 38.36	2.0510	12 13 47.5	8.535	5	4 53 38.19	2.2914	17 51 23.3	5.171
6	3 11 41.54	2.0553	12 22 18.1	8.486	6	4 55 55.84	2.2967	17 56 30.8	5.077
7	3 13 44.98	2.0596	12 30 45.8	8.436	7	4 58 13.80	2.3021	18 1 32.6	4.982
8	3 15 48.69	2.0640	12 39 10.5	8.386	8	5 0 32.09	2.3075	18 6 28.7	4.887
9	3 17 52.66	2.0684	12 47 32.1	8.335	9	5 2 50.70	2.3128	18 11 19.0	4.790
10	3 19 56.89	2.0728	12 55 50.6	8.283	10	5 5 9.63	2.3181	18 16 3.5	4.692
11	3 22 1.40	2.0773	13 4 6.0	8.230	11	5 7 28.88	2.3235	18 20 42.1	4.594
12	3 24 6.17	2.0819	13 12 18.2	8.176	12	5 9 48.45	2.3288	18 25 14.8	4.495
13	3 26 11.22	2.0865	13 20 27.1	8.121	13	5 12 8.34	2.3341	18 29 41.5	4.394
14	3 28 16.55	2.0911	13 28 32.7	8.066	14	5 14 28.54	2.3394	18 34 2.1	4.292
15	3 30 22.16	2.0957	13 36 35.0	8.009	15	5 16 49.06	2.3447	18 38 16.6	4.190
16	3 32 28.04	2.1004	13 44 33.8	7.951	16	5 19 9.90	2.3499	18 42 24.9	4.086
17	3 34 34.21	2.1051	13 52 29.2	7.893	17	5 21 31.05	2.3551	18 46 27.0	3.982
18	3 36 40.66	2.1099	14 0 21.0	7.834	18	5 23 52.51	2.3603	18 50 22.7	3.876
19	3 38 47.39	2.1147	14 8 9.3	7.774	19	5 26 14.29	2.3655	18 54 12.1	3.770
20	3 40 54.41	2.1195	14 15 54.0	7.713	20	5 28 36.37	2.3706	18 57 55.1	3.662
21	3 43 1.73	2.1243	14 23 34.9	7.651	21	5 30 58.76	2.3757	19 1 31.6	3.554
22	3 45 9.34	2.1292	14 31 12.1	7.588	22	5 33 21.46	2.3808	19 5 1.6	3.444
23	3 47 17.24	2.1342	14 38 45.5	7.524	23	5 35 44.46	2.3859	19 8 25.0	3.334
24	3 49 25.44	2.1391	N. 14° 46' 15.1"	7.460	24	5 38 7.76	2.3909	N. 19° 11' 41.7"	3.223

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 21.					TUESDAY 23.				
0	5 38 7.76	2.3909	N.19 11' 41.7"	3.923	0	7 37 40.19	2.5697	N.19 21' 36.6"	2.949
1	5 40 31.37	2.3959	19 14 51.8	3.119	1	7 40 14.00	2.5644	19 20 35.5	3.087
2	5 42 55.27	2.4009	19 17 55.1	2.999	2	7 42 47.91	2.5659	19 17 26.1	3.226
3	5 45 19.47	2.4058	19 20 51.6	2.885	3	7 45 21.91	2.5673	19 14 8.4	3.365
4	5 47 43.96	2.4107	19 23 41.3	2.770	4	7 47 55.99	2.5687	19 10 42.4	3.503
5	5 50 8.75	2.4155	19 26 24.1	2.654	5	7 50 30.15	2.5699	19 7 8.0	3.641
6	5 52 33.82	2.4203	19 28 59.9	2.538	6	7 53 4.38	2.5711	19 3 25.4	3.779
7	5 54 59.18	2.4250	19 31 28.6	2.420	7	7 55 38.68	2.5722	18 59 34.5	3.917
8	5 57 24.82	2.4297	19 33 50.3	2.302	8	7 58 13.04	2.5732	18 55 35.3	4.055
9	5 59 50.74	2.4344	19 36 4.9	2.183	9	8 0 47.46	2.5740	18 51 27.8	4.193
10	6 2 16.94	2.4390	19 38 12.3	2.062	10	8 3 21.93	2.5748	18 47 12.1	4.331
11	6 4 43.41	2.4435	19 40 12.4	1.941	11	8 5 56.45	2.5755	18 42 48.2	4.468
12	6 7 10.16	2.4480	19 42 5.2	1.820	12	8 8 31.00	2.5762	18 38 16.0	4.605
13	6 9 37.18	2.4525	19 43 50.7	1.697	13	8 11 5.59	2.5767	18 33 35.6	4.742
14	6 12 4.46	2.4569	19 45 28.9	1.574	14	8 13 40.21	2.5771	18 28 47.0	4.878
15	6 14 32.00	2.4612	19 46 59.7	1.451	15	8 16 14.85	2.5774	18 23 50.2	5.014
16	6 16 59.80	2.4655	19 48 23.0	1.327	16	8 18 49.50	2.5777	18 18 45.3	5.149
17	6 19 27.86	2.4697	19 49 38.9	1.202	17	8 21 24.16	2.5778	18 13 32.3	5.284
18	6 21 56.16	2.4738	19 50 47.2	1.076	18	8 23 58.83	2.5778	18 8 11.2	5.419
19	6 24 24.71	2.4779	19 51 48.0	0.949	19	8 26 33.50	2.5778	18 2 42.0	5.553
20	6 26 53.51	2.4819	19 52 41.1	0.822	20	8 29 8.16	2.5777	17 57 4.8	5.686
21	6 29 22.54	2.4858	19 53 26.5	0.694	21	8 31 42.82	2.5774	17 51 19.6	5.819
22	6 31 51.81	2.4896	19 54 4.3	0.565	22	8 34 17.46	2.5771	17 45 26.5	5.952
23	6 34 21.31	2.4936	N.19 54 34.3	0.435	23	8 36 52.08	2.5767	N.17 39 25.4	6.084
MONDAY 22.					WEDNESDAY 24.				
0	6 36 51.04	2.4973	N.19 54 56.5	0.305	0	8 39 26.67	2.5763	N.17 33 16.4	6.215
1	6 39 20.99	2.5010	19 55 10.9	0.174	1	8 42 1.24	2.5758	17 26 59.5	6.346
2	6 41 51.16	2.5046	19 55 17.4	0.043	2	8 44 35.77	2.5751	17 20 34.8	6.477
3	6 44 21.54	2.5081	19 55 16.0	0.089	3	8 47 10.25	2.5744	17 14 2.3	6.606
4	6 46 52.13	2.5115	19 55 6.7	0.222	4	8 49 44.69	2.5736	17 7 22.1	6.734
5	6 49 22.93	2.5149	19 54 49.4	0.354	5	8 52 19.08	2.5727	17 0 34.2	6.862
6	6 51 53.92	2.5182	19 54 24.2	0.487	6	8 54 53.42	2.5718	16 53 38.6	6.990
7	6 54 25.11	2.5215	19 53 50.9	0.621	7	8 57 27.70	2.5708	16 46 35.5	7.116
8	6 56 56.49	2.5245	19 53 9.6	0.755	8	9 0 1.92	2.5697	16 39 24.8	7.240
9	6 59 28.05	2.5275	19 52 20.2	0.890	9	9 2 36.07	2.5685	16 32 6.7	7.364
10	7 1 59.79	2.5305	19 51 22.8	1.025	10	9 5 10.14	2.5672	16 24 41.1	7.488
11	7 4 31.70	2.5334	19 50 17.2	1.161	11	9 7 44.14	2.5659	16 17 8.1	7.611
12	7 7 3.79	2.5362	19 49 3.5	1.297	12	9 10 18.05	2.5645	16 9 27.8	7.732
13	7 9 36.04	2.5389	19 47 41.6	1.434	13	9 12 51.88	2.5631	16 1 40.3	7.853
14	7 12 8.45	2.5415	19 46 11.5	1.570	14	9 15 25.62	2.5615	15 53 45.5	7.972
15	7 14 41.02	2.5440	19 44 33.2	1.707	15	9 17 59.26	2.5599	15 45 43.6	8.091
16	7 17 13.74	2.5464	19 42 46.6	1.844	16	9 20 32.81	2.5583	15 37 34.6	8.208
17	7 19 46.60	2.5488	19 40 51.8	1.982	17	9 23 6.26	2.5566	15 29 18.6	8.324
18	7 22 19.60	2.5511	19 38 48.8	2.119	18	9 25 39.60	2.5548	15 20 55.7	8.439
19	7 24 52.73	2.5533	19 36 37.5	2.257	19	9 28 12.83	2.5529	15 12 25.9	8.553
20	7 27 25.99	2.5554	19 34 17.9	2.395	20	9 30 45.95	2.5510	15 3 49.3	8.666
21	7 29 59.37	2.5573	19 31 50.0	2.533	21	9 33 18.95	2.5491	14 55 6.0	8.778
22	7 32 32.87	2.5592	19 29 13.9	2.672	22	9 35 51.84	2.5470	14 46 16.0	8.888
23	7 35 6.48	2.5610	19 26 29.4	2.810	23	9 38 24.60	2.5450	14 37 19.5	8.997
24	7 37 40.19	2.5627	N.19 23 36.6	2.949	24	9 40 57.24	2.5429	N.14 28 16.5	9.105

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 25.					SATURDAY 27.				
0	9 40 57.24	2.5429	N.14 28 16.5	9.105	0	11 39 56.73	2.4096	N. 5 34 43.1	12.509
1	9 43 29.75	2.5407	14 19 7.0	9.212	1	11 42 21.23	2.4070	5 22 11.6	12.539
2	9 46 2.12	2.5384	14 9 51.1	9.317	2	11 44 45.57	2.4041	5 9 38.4	12.567
3	9 48 34.36	2.5362	14 0 28.9	9.421	3	11 47 9.73	2.4014	4 57 3.5	12.594
4	9 51 6.46	2.5339	13 51 0.5	9.524	4	11 49 33.73	2.3986	4 44 27.1	12.619
5	9 53 38.42	2.5315	13 41 26.0	9.626	5	11 51 57.56	2.3958	4 31 49.2	12.643
6	9 56 10.24	2.5291	13 31 45.5	9.725	6	11 54 21.23	2.3931	4 19 10.0	12.665
7	9 58 41.92	2.5267	13 21 59.0	9.824	7	11 56 44.73	2.3903	4 6 29.5	12.685
8	10 1 13.45	2.5242	13 12 6.6	9.921	8	11 59 8.07	2.3876	3 53 47.9	12.703
9	10 3 44.82	2.5217	13 2 8.5	10.016	9	12 1 31.25	2.3849	3 41 5.2	12.720
10	10 6 16.04	2.5191	12 52 4.7	10.111	10	12 3 54.26	2.3823	3 28 21.5	12.735
11	10 8 47.11	2.5164	12 41 55.2	10.204	11	12 6 17.12	2.3796	3 15 37.0	12.748
12	10 11 18.02	2.5138	12 31 40.2	10.296	12	12 8 39.82	2.3770	3 2 51.7	12.760
13	10 13 48.77	2.5111	12 21 19.8	10.385	13	12 11 2.36	2.3744	2 50 5.8	12.770
14	10 16 19.36	2.5084	12 10 54.0	10.473	14	12 13 24.75	2.3718	2 37 19.3	12.778
15	10 18 49.79	2.5057	12 0 23.0	10.560	15	12 15 46.98	2.3693	2 24 32.4	12.785
16	10 21 20.05	2.5030	11 49 46.8	10.646	16	12 18 9.06	2.3668	2 11 45.1	12.790
17	10 23 50.15	2.5002	11 39 5.5	10.730	17	12 20 30.99	2.3643	1 58 57.6	12.794
18	10 26 20.08	2.4974	11 28 19.2	10.812	18	12 22 52.78	2.3618	1 46 9.9	12.796
19	10 28 49.84	2.4946	11 17 28.1	10.892	19	12 25 14.42	2.3594	1 33 22.1	12.796
20	10 31 19.43	2.4918	11 6 32.1	10.971	20	12 27 35.91	2.3570	1 20 34.4	12.795
21	10 33 48.85	2.4890	10 55 31.5	11.049	21	12 29 57.26	2.3546	1 7 46.8	12.792
22	10 36 18.10	2.4860	10 44 26.3	11.125	22	12 32 18.47	2.3523	0 54 59.4	12.787
23	10 38 47.18	2.4831	N.10 33 16.5	11.199	23	12 34 39.54	2.3500	N. 0 42 12.3	12.781
FRIDAY 26.					SUNDAY 28.				
0	10 41 16.08	2.4802	N.10 22 2.4	11.272	0	12 37 0.47	2.3477	N. 0 29 25.6	12.774
1	10 43 44.81	2.4773	10 10 44.0	11.343	1	12 39 21.26	2.3454	0 16 39.4	12.785
2	10 46 13.36	2.4744	9 59 21.3	11.412	2	12 41 41.92	2.3432	N. 0 3 53.8	12.784
3	10 48 41.74	2.4715	9 47 54.6	11.479	3	12 44 2.45	2.3410	S. 0 8 51.1	12.742
4	10 51 9.94	2.4685	9 36 23.8	11.545	4	12 46 22.84	2.3388	0 21 35.2	12.798
5	10 53 37.96	2.4656	9 24 49.1	11.610	5	12 48 43.10	2.3367	0 34 18.5	12.713
6	10 56 5.81	2.4626	9 13 10.6	11.672	6	12 51 3.24	2.3346	0 47 0.8	12.697
7	10 58 33.48	2.4597	9 1 28.5	11.733	7	12 53 23.25	2.3325	0 59 42.1	12.679
8	11 1 0.97	2.4567	8 49 42.7	11.792	8	12 55 43.14	2.3305	1 12 22.3	12.659
9	11 3 28.28	2.4537	8 37 53.4	11.850	9	12 58 2.91	2.3285	1 25 1.2	12.638
10	11 5 55.41	2.4508	8 26 0.7	11.906	10	13 0 22.56	2.3265	1 37 38.8	12.615
11	11 8 22.37	2.4478	8 14 4.7	11.960	11	13 2 42.09	2.3246	1 50 15.0	12.591
12	11 10 49.15	2.4448	8 2 5.5	12.012	12	13 5 1.51	2.3227	2 2 49.7	12.566
13	11 13 15.75	2.4419	7 50 3.2	12.063	13	13 7 20.81	2.3208	2 15 22.9	12.540
14	11 15 42.17	2.4389	7 37 57.9	12.112	14	13 9 40.00	2.3190	2 27 54.5	12.512
15	11 18 8.42	2.4359	7 25 49.8	12.159	15	13 11 59.09	2.3172	2 40 24.3	12.482
16	11 20 34.49	2.4330	7 13 38.9	12.205	16	13 14 18.07	2.3154	2 52 52.3	12.452
17	11 23 0.38	2.4300	7 1 25.3	12.249	17	13 16 36.94	2.3137	3 5 18.5	12.420
18	11 25 26.10	2.4271	6 49 9.1	12.291	18	13 18 55.71	2.3120	3 17 42.7	12.386
19	11 27 51.64	2.4242	6 36 50.4	12.331	19	13 21 14.38	2.3103	3 30 4.9	12.351
20	11 30 17.01	2.4213	6 24 29.3	12.370	20	13 23 32.95	2.3086	3 42 24.9	12.315
21	11 32 42.20	2.4184	6 12 5.9	12.407	21	13 25 51.42	2.3070	3 54 42.7	12.278
22	11 35 7.22	2.4155	5 59 40.4	12.443	22	13 28 9.79	2.3054	4 6 58.2	12.239
23	11 37 32.06	2.4126	5 47 12.7	12.477	23	13 30 28.06	2.3038	4 19 11.4	12.199
24	11 39 56.73	2.4098	N. 5 34 43.1	12.509	24	13 32 46.24	2.3023	S. 4 31 22.1	12.158



**GREENWICH MEAN TIME.**

**THE MOON'S RIGHT ASCENSION AND DECLINATION.**

**PHASES OF THE MOON.**

	d	h	m
☾ Last Quarter, . . . . .	3	4	56.1
● New Moon, . . . . .	11	1	53.9
☾ First Quarter, . . . . .	19	5	6.1
○ Full Moon, . . . . .	26	0	4.6

	d	h
☾ Apogee, . . . . .	12	16.3
☾ Perigee, . . . . .	26	1.4

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Pollux W.	82° 24' 39"	2306	84° 10' 30"	2320	85° 56' 0"	2335	87° 41' 8"	2351
	Regulus W.	46 22 56	2252	48 10 6	2268	49 56 53	2283	51 43 18	2298
	Mars W.	44 24 23	2163	46 13 47	2176	48 2 51	2190	49 51 33	2205
	Antares E.	54 21 7	2346	52 36 14	2365	50 51 49	2386	49 7 54	2407
	Saturn E.	60 36 50	2285	58 50 28	2300	57 4 29	2316	55 18 53	2333
	Venus E.	94 19 6	2652	92 41 21	2669	91 3 59	2685	89 26 59	2702
	α Aquilæ E.	101 19 5	2798	99 44 35	2809	98 10 19	2819	96 36 16	2831
	Sun E.	118 21 51	2571	116 42 15	2587	115 3 2	2604	113 24 12	2620
2	Pollux W.	96 21 6	2431	98 3 57	2447	99 46 25	2464	101 28 29	2480
	Regulus W.	60 29 38	2377	62 13 46	2394	63 57 30	2409	65 40 52	2426
	Mars W.	58 49 38	2278	60 36 10	2293	62 22 20	2308	64 8 8	2323
	Antares E.	40 36 14	2527	38 55 38	2554	37 15 40	2583	35 36 22	2614
	Saturn E.	46 36 44	2414	44 53 29	2430	43 10 37	2447	41 28 9	2465
	Venus E.	81 27 44	2789	79 53 2	2806	78 18 42	2824	76 44 45	2842
	α Aquilæ E.	88 50 13	2904	87 17 59	2921	85 46 7	2940	84 14 39	2959
	Sun E.	105 15 42	2705	103 39 9	2722	102 2 58	2739	100 27 10	2756
3	Regulus W.	74 12 5	2503	75 53 14	2518	77 34 2	2533	79 14 29	2548
	Mars W.	72 51 42	2397	74 35 21	2412	76 18 39	2426	78 1 37	2440
	Spica W.	21 26 37	2730	23 2 37	2717	24 38 54	2708	26 15 23	2702
	Saturn E.	33 1 50	2550	31 21 46	2568	29 42 7	2585	28 2 52	2604
	Venus E.	69 0 35	2927	67 28 51	2944	65 57 28	2962	64 26 27	2978
	α Aquilæ E.	76 43 36	3066	75 14 45	3091	73 46 24	3116	72 18 34	3142
	Sun E.	92 33 46	2841	91 0 11	2857	89 26 57	2873	87 54 4	2889
4	Regulus W.	87 31 38	2621	89 10 5	2635	90 48 13	2648	92 26 3	2661
	Mars W.	86 31 29	2509	88 12 30	2522	89 53 13	2535	91 33 37	2548
	Spica W.	34 18 12	2716	35 54 30	2722	37 30 40	2730	39 6 40	2737
	Venus E.	56 56 24	3057	55 27 22	3073	53 58 39	3088	52 30 15	3103
	α Aquilæ E.	65 7 34	3288	63 43 8	3320	62 19 20	3355	60 56 12	3392
	Sun E.	80 14 43	2968	78 43 50	2982	77 13 15	2997	75 42 59	3012
5	Regulus W.	100 30 49	2725	102 6 56	2737	103 42 47	2748	105 18 23	2760
	Mars W.	99 51 20	2609	101 30 3	2620	103 8 31	2632	104 46 43	2642
	Spica W.	47 3 58	2789	48 38 50	2791	50 13 30	2800	51 47 58	2809
	Venus E.	45 12 40	3174	43 46 0	3188	42 19 36	3201	40 53 28	3214
	α Aquilæ E.	54 11 32	3603	52 53 1	3653	51 35 24	3708	50 18 45	3764
	Sun E.	68 16 1	3081	66 47 28	3093	65 19 10	3105	63 51 7	3119
6	Regulus W.	113 12 44	2813	114 46 55	2823	116 20 53	2832	117 54 39	2842
	Mars W.	112 54 8	2694	114 30 56	2704	116 7 31	2713	117 43 54	2722
	Spica W.	59 37 20	2854	61 10 38	2863	62 43 44	2871	64 16 40	2880
	Antares W.	16 5 35	3678	17 22 45	3549	18 42 15	3449	20 3 36	3373
	Venus E.	33 46 32	3275	32 21 51	3287	30 57 24	3299	29 33 11	3310
	α Aquilæ E.	44 11 40	4121	43 1 59	4211	41 53 43	4309	40 46 59	4418
	Sun E.	56 34 35	3177	55 7 58	3187	53 41 33	3198	52 15 21	3208
7	Spica W.	71 58 40	2920	73 30 34	2927	75 2 19	2935	76 33 54	2942
	Antares W.	27 6 55	3175	28 33 34	3156	30 0 36	3140	31 27 57	3128
	Saturn W.	18 30 54	2969	20 1 46	2969	21 32 38	2970	23 3 28	2972
	Sun E.	45 7 17	3255	43 42 13	3264	42 17 19	3273	40 52 36	3281
8	Spica W.	84 9 39	2975	85 40 23	2981	87 10 59	2986	88 41 20	2993

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Pollux W.	89° 25' 53"	2367	91° 10' 15"	2382	92° 54' 15"	2398	94° 37' 52"	2415
	Regulus W.	53 29 20	2314	55 14 59	2330	57 0 15	2346	58 45 8	2362
	Mars W.	51 39 53	2219	53 27 52	2234	55 15 29	2249	57 2 44	2263
	Antares E.	47 24 29	2429	45 41 36	2452	43 59 15	2475	42 17 27	2500
	Saturn E.	53 33 41	2348	51 48 52	2364	50 4 26	2380	48 20 23	2397
	Venus E.	87 50 22	2719	86 14 8	2737	84 38 17	2754	83 2 49	2772
	α Aquilæ E.	95 2 28	2843	93 28 56	2857	91 55 42	2873	90 22 48	2887
	SUN E.	111 45 44	2837	110 7 39	2854	108 29 57	2871	106 52 38	2888
2	Pollux W.	103 10 11	2497	104 51 29	2513	106 32 24	2530	108 12 56	2546
	Regulus W.	67 23 50	2441	69 6 27	2456	70 48 42	2472	72 30 35	2488
	Mars W.	65 53 34	2338	67 38 38	2353	69 23 21	2368	71 7 42	2382
	Antares E.	33 57 46	2648	32 19 56	2684	30 42 55	2723	29 6 46	2767
	Saturn E.	39 46 6	2481	38 4 26	2498	36 23 10	2515	34 42 18	2533
	Venus E.	75 11 11	2859	73 37 59	2876	72 5 9	2893	70 32 41	2910
	α Aquilæ E.	82 43 35	2978	81 12 55	2999	79 42 41	3022	78 12 55	3043
	SUN E.	98 51 45	2773	97 16 42	2791	95 42 2	2807	94 7 43	2824
3	Regulus W.	80 54 35	2563	82 34 21	2578	84 13 46	2592	85 52 52	2607
	Mars W.	79 44 15	2454	81 26 33	2468	83 8 31	2482	84 50 10	2496
	Spica W.	27 52 0	2701	29 28 38	2702	31 5 15	2707	32 41 46	2710
	Saturn E.	26 24 2	2622	24 45 37	2641	23 7 38	2660	21 30 5	2682
	Venus E.	62 55 46	2994	61 25 26	3010	59 55 26	3026	58 25 45	3042
	α Aquilæ E.	70 51 15	3168	69 24 28	3197	67 58 15	3226	66 32 37	3257
	SUN E.	86 21 31	2905	84 49 19	2921	83 17 27	2937	81 45 55	2953
4	Regulus W.	94 3 35	2675	95 40 49	2687	97 17 46	2700	98 54 26	2713
	Mars W.	93 13 44	2561	94 53 33	2573	96 33 5	2585	98 12 21	2597
	Spica W.	40 42 31	2746	42 18 10	2754	43 53 38	2763	45 28 54	2772
	Venus E.	51 2 9	3118	49 34 21	3132	48 6 50	3146	46 39 36	3161
	α Aquilæ E.	59 33 46	3430	58 12 3	3470	56 51 5	3512	55 30 54	3556
	SUN E.	74 13 1	3026	72 43 20	3040	71 13 57	3054	69 44 51	3067
5	Regulus W.	106 53 44	2771	108 28 50	2782	110 3 41	2792	111 38 19	2802
	Mars W.	106 24 41	2653	108 2 24	2664	109 39 52	2674	111 17 7	2684
	Spica W.	53 22 14	2818	54 56 18	2826	56 30 10	2836	58 3 51	2845
	Venus E.	39 27 35	3227	38 1 58	3239	36 36 35	3252	35 11 27	3263
	α Aquilæ E.	49 3 5	3325	47 48 29	3391	46 35 0	3361	45 22 42	4038
	SUN E.	62 23 20	3131	60 55 48	3143	59 28 30	3154	58 1 26	3165
6	Regulus W.	119 28 12	2852	121 1 33	2860	122 34 43	2869	124 7 41	2877
	Mars W.	119 20 4	2732	120 56 2	2740	122 31 49	2749	124 7 24	2757
	Spica W.	65 49 25	2888	67 21 59	2896	68 54 23	2904	70 26 37	2912
	Antares W.	21 26 23	3313	22 50 19	3266	24 15 10	3229	25 40 45	3199
	Venus E.	28 9 11	3391	26 45 24	3339	25 21 50	3344	23 58 29	3355
	α Aquilæ E.	39 41 54	4536	38 38 34	4666	37 37 6	4811	36 37 39	4971
	SUN E.	50 49 21	3218	49 23 33	3228	47 57 57	3237	46 32 32	3246
7	Spica W.	78 5 20	2949	79 36 37	2955	81 7 46	2962	82 38 47	2969
	Antares W.	32 55 33	3118	34 23 21	3110	35 51 18	3103	37 19 24	3097
	Saturn W.	24 34 16	2976	26 4 59	2980	27 35 38	2983	29 6 12	2988
	SUN E.	39 28 2	3288	38 3 37	3297	36 39 22	3305	35 15 16	3312
8	Spica W.	90 11 50	2999	91 42 4	3005	93 12 10	3012	94 42 8	3010

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
8	Antares W.	38° 47' 37"	3095	40° 15' 53"	3092	41° 44' 12"	3090	43° 12' 34"	3087
	Saturn W.	30 36 40	2992	32 7 3	2997	33 37 20	3001	35 7 32	3005
	Sun E.	33 51 18	3319	32 27 28	3325	31 3 46	3332	29 40 12	3339
13	Sun W.	20 53 11	3463	22 14 17	3462	23 35 24	3462	24 56 31	3461
	α Arietis E.	51 32 11	3337	50 8 42	3348	48 45 26	3360	47 22 24	3374
	Aldebaran E.	82 8 9	3075	80 39 29	3074	79 10 48	3074	77 42 7	3074
14	Sun W.	31 42 22	3454	33 3 37	3452	34 24 55	3450	35 46 15	3446
	α Arietis E.	40 31 36	3463	39 10 31	3488	37 49 53	3515	36 29 45	3544
	Aldebaran E.	70 18 30	3069	68 49 42	3065	67 20 50	3065	65 51 57	3061
	Pollux E.	114 12 4	3131	112 44 32	3128	111 16 56	3124	109 49 16	3120
15	Sun W.	42 33 50	3429	43 55 34	3424	45 17 23	3419	46 39 18	3414
	Aldebaran E.	58 26 38	3045	56 57 21	3041	55 27 59	3036	53 58 31	3032
	Pollux E.	102 29 46	3100	101 1 36	3096	99 33 21	3091	98 5 0	3085
16	Sun W.	53 30 31	3322	54 53 8	3374	56 15 54	3366	57 38 49	3358
	Aldebaran E.	46 29 36	3002	44 59 26	2996	43 29 8	2989	41 58 41	2981
	Pollux E.	90 41 30	3055	89 12 25	3048	87 43 12	3042	86 13 50	3034
	Mars E.	122 53 51	2875	121 21 0	2868	119 48 0	2861	118 14 51	2853
17	Sun W.	64 35 56	3311	65 59 56	3300	67 24 7	3298	68 48 32	3277
	Jupiter W.	19 59 58	3067	21 28 48	3051	22 57 58	3035	24 27 27	3020
	Aldebaran E.	34 23 53	2938	32 52 22	2927	31 20 38	2917	29 48 41	2907
	Pollux E.	78 44 35	2992	77 14 12	2983	75 43 38	2973	74 12 52	2963
	Mars E.	110 26 29	2810	108 52 14	2801	107 17 47	2791	105 43 7	2780
	Regulus E.	114 32 36	2938	113 1 5	2927	111 29 20	2917	109 57 23	2906
18	Sun W.	75 54 9	3213	77 20 3	3199	78 46 13	3185	80 12 40	3170
	Jupiter W.	31 59 39	2945	33 31 1	2930	35 2 42	2914	36 34 43	2899
	Pollux E.	66 35 49	2911	65 3 44	2900	63 31 25	2888	61 58 51	2876
	Mars E.	97 46 14	2794	96 10 6	2711	94 33 41	2699	92 57 0	2686
	Regulus E.	102 14 4	2848	100 40 38	2835	99 6 55	2821	97 32 54	2808
19	Sun W.	87 29 32	3091	88 57 53	3073	90 26 35	3056	91 55 38	3039
	Jupiter W.	44 19 44	2820	45 53 46	2803	47 28 10	2786	49 2 56	2769
	α Arietis W.	27 7 15	3555	28 26 39	3458	29 47 50	3373	31 10 37	3297
	Pollux E.	54 12 14	2817	52 38 8	2805	51 3 46	2792	49 29 8	2781
	Mars E.	84 49 0	2615	83 10 26	2601	81 31 32	2585	79 52 17	2570
	Regulus E.	89 38 20	2735	88 2 26	2719	86 26 11	2703	84 49 35	2687
20	Sun W.	99 26 29	2946	100 57 50	2927	102 29 34	2908	104 1 43	2888
	Jupiter W.	57 2 27	2681	58 39 33	2663	60 17 3	2644	61 54 58	2625
	α Arietis W.	38 24 16	3009	39 54 17	2964	41 25 15	2922	42 57 6	2883
	Pollux E.	41 32 15	2797	39 56 11	2719	38 19 56	2710	36 43 30	2704
	Mars E.	71 30 36	2489	69 49 8	2472	68 7 16	2455	66 25 0	2438
	Regulus E.	76 41 0	2601	75 2 6	2583	73 22 48	2566	71 43 7	2548
21	Sun W.	111 48 50	2788	113 23 34	2768	114 58 44	2747	116 34 21	2728
	Jupiter W.	70 11 1	2530	71 51 33	2511	73 32 31	2492	75 13 56	2472
	α Arietis W.	50 48 19	2710	52 24 45	2680	54 1 52	2651	55 30 38	2622
	Aldebaran W.	16 51 25	2457	18 33 39	2437	20 16 21	2418	21 59 30	2399
	Pollux E.	28 40 6	2706	27 3 34	2720	25 27 21	2739	23 51 33	2767

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## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXh.	P. L. of Diff.
8	Antares	W.	44° 40' 59"	3087	46° 9' 24"	3087	47° 37' 49"	3087	49° 6' 14"	3087
	Saturn	W.	36 37 38	3010	38 7 38	3014	39 37 33	3019	41 7 22	3024
	Sun	E.	28 16 46	3345	26 53 27	3351	25 30 15	3358	24 7 11	3365
13	Sun	W.	26 17 39	3461	27 38 47	3459	28 59 57	3458	30 21 8	3455
	α Arietis	E.	45 59 38	3388	44 37 8	3405	43 14 57	3422	41 53 5	3442
	Aldebaran	E.	76 13 26	3073	74 44 44	3073	73 16 1	3071	71 47 16	3070
14	Sun	W.	37 7 39	3444	38 29 6	3441	39 50 36	3437	41 12 11	3433
	α Arietis	E.	35 10 9	3578	33 51 11	3617	32 32 55	3663	31 15 29	3713
	Aldebaran	E.	64 23 0	3059	62 54 0	3056	61 24 57	3052	59 55 49	3050
	Pollux	E.	108 21 31	3117	106 53 42	3113	105 25 48	3109	103 57 49	3105
15	Sun	W.	48 1 19	3408	49 23 26	3402	50 45 40	3395	52 8 2	3389
	Aldebaran	E.	52 28 58	3096	50 59 18	3092	49 29 32	3015	47 59 38	3009
	Pollux	E.	96 36 32	3079	95 7 57	3073	93 39 15	3068	92 10 26	3062
16	Sun	W.	59 1 53	3349	60 25 8	3340	61 48 33	3331	63 12 9	3321
	Aldebaran	E.	40 28 4	2973	38 57 17	2965	37 26 20	2956	35 55 12	2947
	Pollux	E.	84 44 19	3026	83 14 38	3018	81 44 47	3009	80 14 46	3001
	Mars	E.	116 41 32	2845	115 8 3	2837	113 34 23	2828	112 0 32	2819
17	Sun	W.	70 13 10	3265	71 38 2	3253	73 3 9	3240	74 28 31	3226
	Jupiter	W.	25 57 15	3005	27 27 22	2969	28 57 49	2973	30 28 35	2959
	Aldebaran	E.	28 16 31	2896	26 44 7	2884	25 11 28	2873	23 38 35	2861
	Pollux	E.	72 41 53	2954	71 10 42	2943	69 39 18	2932	68 7 40	2922
	Mars	E.	104 8 13	2769	102 33 5	2759	100 57 43	2747	99 22 6	2736
	Regulus	E.	108 25 12	2895	106 52 47	2884	105 20 8	2872	103 47 13	2861
18	Sun	W.	81 39 25	3155	83 6 28	3139	84 33 50	3124	86 1 31	3107
	Jupiter	W.	38 7 3	2884	39 39 42	2868	41 12 42	2852	42 46 3	2836
	Pollux	E.	60 26 2	2865	58 52 58	2853	57 19 39	2841	55 46 4	2829
	Mars	E.	91 20 1	2672	89 42 44	2658	88 5 8	2645	86 27 14	2630
	Regulus	E.	95 58 37	2794	94 24 1	2780	92 49 7	2765	91 13 53	2750
19	Sun	W.	93 25 3	3091	94 54 50	3002	96 25 0	2984	97 55 33	2965
	Jupiter	W.	50 38 4	2752	52 13 35	2735	53 49 29	2717	55 25 46	2699
	α Arietis	W.	32 34 52	3228	34 0 28	3167	35 27 17	3110	36 55 15	3058
	Pollux	E.	47 54 15	2769	46 19 7	2758	44 43 44	2747	43 8 6	2737
	Mars	E.	78 12 41	2554	76 32 43	2538	74 52 23	2522	73 11 41	2506
	Regulus	E.	83 12 38	2669	81 35 17	2653	79 57 34	2636	78 19 28	2620
20	Sun	W.	105 34 17	2868	107 7 17	2848	108 40 42	2828	110 14 33	2808
	Jupiter	W.	63 33 19	2807	65 12 5	2587	66 51 18	2569	68 30 56	2549
	α Arietis	W.	44 29 47	2845	46 3 17	2808	47 37 34	2775	49 12 55	2742
	Pollux	E.	35 6 55	2899	33 30 14	2897	31 53 30	2897	30 16 46	2700
	Mars	E.	64 42 20	2421	62 59 15	2404	61 15 46	2387	59 31 52	2368
	Regulus	E.	70 3 0	2539	68 22 27	2511	66 41 29	2492	65 0 5	2474
21	Sun	W.	118 16 24	2706	119 46 55	2687	121 23 52	2666	123 1 17	2646
	Jupiter	W.	76 55 48	2453	78 38 7	2434	80 20 53	2415	82 4 6	2396
	α Arietis	W.	57 18 3	2595	58 57 5	2568	60 36 44	2543	62 16 58	2517
	Aldebaran	W.	23 43 6	2390	25 27 9	2361	27 11 40	2342	28 56 38	2324
	Pollux	E.	22 16 22	2908	20 42 4	2863	19 8 58	2842	17 37 32	2822

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## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
21	Mars E.	57° 47' 32"	2351	56° 2' 47"	2334	54° 17' 37"	2317	52° 32' 2"	2299
	Regulus E.	63 18 15	2455	61 35 58	2436	59 53 15	2417	58 10 5	2398
	Spica E.	116 55 49	2492	115 14 25	2473	113 32 34	2453	111 50 15	2433
22	Sun W.	124 39 9	2627	126 17 27	2607	127 56 12	2588	129 35 23	2569
	Jupiter W.	83 47 47	2377	85 31 55	2359	87 16 29	2340	89 1 30	2322
	α Arietis W.	63 57 47	2493	65 39 10	2470	67 21 5	2447	69 3 33	2425
	Aldebaran W.	30 42 3	2305	32 27 55	2287	34 14 14	2269	36 0 59	2251
	Mars E.	43 37 45	2215	41 49 40	2200	40 1 12	2184	38 12 20	2169
	Regulus E.	49 27 26	2305	47 41 34	2287	45 55 15	2268	44 8 29	2250
	Spica E.	103 11 41	2337	101 26 35	2318	99 41 2	2300	97 55 2	2282
23	Jupiter W.	97 53 2	2236	99 40 36	2220	101 28 33	2204	103 16 54	2190
	α Arietis W.	77 43 26	2325	79 28 49	2307	81 14 39	2289	83 0 54	2274
	Aldebaran W.	45 1 20	2165	46 50 40	2149	48 40 24	2134	50 30 32	2118
	Mars E.	29 2 41	2105	27 11 50	2098	25 20 47	2090	23 29 33	2086
	Regulus E.	35 8 8	2165	33 18 48	2149	31 29 4	2134	29 38 57	2119
	Spica E.	88 58 30	2196	87 9 56	2180	85 20 58	2165	83 31 37	2149
24	α Arietis W.	91 57 43	2204	93 46 4	2193	95 34 42	2183	97 23 35	2174
	Aldebaran W.	59 46 43	2051	61 38 58	2039	63 31 31	2028	65 24 21	2017
	Pollux W.	17 52 58	2029	19 31 14	2019	21 12 1	2033	22 54 48	2064
	Spica E.	74 19 31	2085	72 28 8	2073	70 36 28	2063	68 44 32	2053
	Antares E.	120 4 28	2130	118 14 14	2115	116 23 37	2101	114 32 39	2088
25	α Arietis W.	106 30 54	2145	108 20 45	2142	110 10 40	2141	112 0 36	2143
	Aldebaran W.	74 52 17	1977	76 46 28	1970	78 40 50	1965	80 35 19	1960
	Pollux W.	31 48 34	2161	33 38 0	2138	35 28 1	2118	37 18 32	2101
	Spica E.	59 21 35	2019	57 28 30	2014	55 35 18	2011	53 42 1	2009
	Antares E.	105 13 29	2039	103 20 56	2033	101 28 12	2026	99 35 19	2021
	Saturn E.	113 44 20	1996	111 50 40	1990	109 56 50	1984	108 2 51	1980
26	Aldebaran W.	90 9 7	1850	92 4 0	1851	93 58 52	1852	95 53 42	1855
	Pollux W.	46 36 36	2048	48 28 55	2042	50 21 23	2039	52 13 56	2037
	Mars W.	17 50 1	1957	19 44 43	1942	21 39 49	1931	23 35 12	1923
	Spica E.	44 15 24	2016	42 22 15	2022	40 29 15	2029	38 36 26	2038
	Antares E.	90 9 22	2010	88 16 3	2010	86 22 44	2012	84 29 28	2015
	Saturn E.	98 31 34	1969	96 37 11	1969	94 42 48	1970	92 48 27	1973
27	Aldebaran W.	105 26 34	1977	107 20 44	1984	109 14 44	1992	111 8 31	2000
	Pollux W.	61 36 57	2044	63 29 23	2048	65 21 42	2054	67 13 52	2061
	Mars W.	33 14 7	1917	35 9 53	1921	37 5 33	1926	39 1 4	1933
	Regulus W.	25 17 54	1977	27 12 4	1986	29 6 1	1992	30 59 48	2000
	Spica E.	29 16 52	2117	27 26 19	2142	25 36 24	2174	23 47 17	2212
	Antares E.	75 4 37	2041	73 12 7	2049	71 19 49	2058	69 27 45	2068
	Saturn E.	83 17 58	1995	81 24 16	2001	79 30 44	2010	77 37 25	2018
	α Aquilæ E.	119 36 38	2692	117 59 48	2675	116 22 34	2660	114 45 0	2648
28	Pollux W.	76 31 40	2107	78 22 28	2118	80 12 59	2131	82 3 11	2144
	Mars W.	48 35 38	1978	50 29 47	1989	52 23 38	2001	54 17 10	2014
	Regulus W.	40 25 4	2052	42 17 17	2065	44 9 10	2077	46 0 44	2091
	Antares E.	60 11 47	2133	58 21 38	2149	56 31 53	2165	54 42 33	2182
	Saturn E.	68 14 29	2071	66 22 45	2083	64 31 20	2097	62 40 16	2110
	α Aquilæ E.	106 34 24	2627	104 56 6	2630	103 17 52	2635	101 39 44	2640

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Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XV <sup>h</sup> .	P. L. of Diff.	XVIII <sup>h</sup> .	P. L. of Diff.	XXI <sup>h</sup> .	P. L. of Diff.
21	Mars	E.	50 46 1	2262	48 59 35	2264	47 12 43	2247	45 25 26	2231
	Regulus	E.	56 26 27	2379	54 42 22	2361	52 57 51	2342	51 12 52	2323
	Spica	E.	110 7 28	2414	108 24 13	2394	106 40 30	2375	104 56 19	2356
22	SUN	W.	131 15 0	2551	132 55 3	2533	134 35 31	2514	136 16 25	2497
	Jupiter	W.	90 46 57	2304	92 32 50	2287	94 19 9	2270	96 5 53	2253
	α Arietis	W.	70 46 32	2403	72 30 2	2382	74 14 2	2363	75 58 30	2344
	Aldebaran	W.	37 48 11	2233	39 35 49	2215	41 23 54	2198	43 12 24	2181
	Mars	E.	36 23 5	2155	34 33 29	2141	32 43 32	2128	30 53 16	2116
	Regulus	E.	42 21 16	2233	40 33 38	2215	38 45 33	2198	36 57 3	2182
	Spica	E.	96 8 36	2264	94 21 43	2246	92 34 24	2229	90 46 39	2212
23	Jupiter	W.	105 5 37	2174	106 54 43	2161	108 44 10	2147	110 33 57	2134
	α Arietis	W.	84 47 32	2258	86 34 33	2243	88 21 56	2229	90 9 40	2216
	Aldebaran	W.	52 21 3	2104	54 11 56	2090	56 3 11	2076	57 54 47	2063
	Mars	E.	21 38 13	2085	19 46 51	2080	17 55 36	2101	16 4 38	2121
	Regulus	E.	27 48 27	2104	25 57 34	2090	24 6 20	2077	22 14 46	2065
	Spica	E.	81 41 53	2135	79 51 47	2122	78 1 21	2109	76 10 35	2097
24	α Arietis	W.	99 12 42	2166	101 2 1	2159	102 51 30	2153	104 41 8	2148
	Aldebaran	W.	67 17 28	2008	69 10 50	1999	71 4 26	1990	72 58 16	1983
	Pollux	W.	24 39 14	2309	26 25 1	2292	28 11 57	2223	29 59 51	2190
	Spica	E.	66 52 21	2045	64 59 57	2037	63 7 20	2030	61 14 32	2024
	Antares	E.	112 41 22	2077	110 49 47	2066	108 57 56	2056	107 5 49	2048
25	α Arietis	W.	113 50 30	2144	115 40 22	2147	117 30 10	2152	119 19 50	2159
	Aldebaran	W.	82 29 56	1957	84 24 38	1954	86 19 25	1952	88 14 15	1951
	Pollux	W.	39 9 30	2086	41 0 51	2073	42 52 31	2063	44 44 27	2055
	Spica	E.	51 48 41	2008	49 55 19	2009	48 1 58	2010	46 8 39	2012
	Antares	E.	97 42 18	2017	95 49 10	2014	93 55 57	2011	92 2 40	2010
	Saturn	E.	106 8 45	1976	104 14 33	1973	102 20 16	1971	100 25 56	1970
26	Aldebaran	W.	97 48 28	1957	99 43 10	1961	101 37 46	1966	103 32 14	1971
	Pollux	W.	54 6 33	2035	55 59 12	2036	57 51 50	2037	59 44 26	2041
	Mars	W.	25 30 49	1918	27 26 34	1915	29 22 25	1913	31 18 17	1914
	Spica	E.	36 43 51	2048	34 51 32	2061	32 59 33	2077	31 7 58	2096
	Antares	E.	82 36 17	2017	80 43 10	2022	78 50 10	2027	76 57 18	2034
	Saturn	E.	90 54 10	1975	88 59 57	1979	87 5 50	1984	85 11 50	1989
27	Aldebaran	W.	113 2 5	2009	114 55 26	2019	116 48 30	2029	118 41 19	2040
	Pollux	W.	69 5 52	2068	70 57 40	2077	72 49 15	2086	74 40 35	2096
	Mars	W.	40 56 25	1939	42 51 35	1948	44 46 31	1958	46 41 12	1967
	Regulus	W.	32 53 22	2010	34 46 41	2019	36 39 45	2030	38 32 33	2041
	Spica	E.	21 59 8	2259	20 12 8	2317	18 26 34	2384	16 42 51	2495
	Antares	E.	67 35 57	2079	65 44 26	2091	63 53 13	2103	62 2 19	2118
	Saturn	E.	75 44 19	2027	73 51 27	2037	71 58 51	2048	70 6 31	2059
	α Aquilæ	E.	113 7 10	2639	111 29 8	2633	109 50 58	2629	108 12 42	2627
28	Pollux	W.	83 53 3	2157	85 42 35	2179	87 31 45	2186	89 20 33	2202
	Mars	W.	56 10 22	2028	58 3 13	2042	59 55 42	2056	61 47 49	2071
	Regulus	W.	47 51 57	2105	49 42 49	2120	51 33 18	2134	53 23 26	2150
	Antares	E.	52 53 38	2200	51 5 11	2220	49 17 14	2241	47 29 47	2263
	Saturn	E.	60 49 32	2124	58 59 10	2139	57 9 10	2155	55 19 34	2170
	α Aquilæ	E.	100 1 44	2648	98 23 54	2657	96 46 17	2669	95 8 55	2681

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.			
Mon.	1	<sup>h</sup> 22 <sup>m</sup> 49 <sup>s</sup> 50.67	9.351	S. <sup>°</sup> 7 <sup>'</sup> 26 <sup>"</sup> 56.1	57.05	16' 10.28	<sup>s</sup> 65.41	<sup>m</sup> 12 <sup>s</sup> 29.97	<sup>s</sup> 0.504
Tues.	2	22 53 34.82	9.331	7 4 3.8	57.31	16 10.03	65.34	12 17.60	0.524
Wed.	3	22 57 18.50	9.312	6 41 5.6	57.55	16 9.78	65.27	12 4.77	0.544
Thur.	4	23 1 1.72	9.294	6 18 1.7	57.78	16 9.53	65.20	11 51.48	0.562
Frid.	5	23 4 44.53	9.277	5 54 52.4	57.99	16 9.27	65.13	11 37.77	0.579
Sat.	6	23 8 26.92	9.260	5 31 38.4	58.19	16 9.01	65.07	11 23.65	0.596
Sun.	7	23 12 8.93	9.244	5 8 19.7	58.37	16 8.75	65.01	11 9.14	0.612
Mon.	8	23 15 50.56	9.229	4 44 57.0	58.53	16 8.49	64.95	10 54.25	0.627
Tues.	9	23 19 31.83	9.214	4 21 30.6	58.68	16 8.22	64.90	10 39.01	0.642
Wed.	10	23 23 12.75	9.200	3 58 0.7	58.81	16 7.96	64.85	10 23.43	0.656
Thur.	11	23 26 53.35	9.187	3 34 27.8	58.93	16 7.69	64.81	10 7.53	0.669
Frid.	12	23 30 33.66	9.175	3 10 52.5	59.03	16 7.42	64.76	9 51.32	0.681
Sat.	13	23 34 13.68	9.163	2 47 14.9	59.11	16 7.15	64.72	9 34.83	0.693
Sun.	14	23 37 53.44	9.153	2 23 35.6	59.18	16 6.88	64.68	9 18.08	0.703
Mon.	15	23 41 32.94	9.143	1 59 55.0	59.23	16 6.62	64.64	9 1.07	0.713
Tues.	16	23 45 12.20	9.133	1 36 13.3	59.26	16 6.35	64.61	8 43.82	0.723
Wed.	17	23 48 51.24	9.124	1 12 30.9	59.28	16 6.08	64.58	8 26.35	0.732
Thur.	18	23 52 30.07	9.116	0 48 48.4	59.28	16 5.81	64.56	8 8.69	0.740
Frid.	19	23 56 8.72	9.109	0 25 6.0	59.37	16 5.55	64.54	7 50.84	0.747
Sat.	20	23 59 47.20	9.103	S. 0 1 24.2	59.24	16 5.28	64.52	7 32.82	0.753
Sun.	21	0 3 25.54	9.097	N. 0 22 16.9	59.20	16 5.01	64.50	7 14.66	0.759
Mon.	22	0 7 3.76	9.092	0 45 56.9	59.14	16 4.74	64.49	6 56.38	0.764
Tues.	23	0 10 41.89	9.088	1 9 35.2	59.06	16 4.47	64.48	6 38.00	0.768
Wed.	24	0 14 19.94	9.085	1 33 11.5	58.97	16 4.20	64.47	6 19.54	0.771
Thur.	25	0 17 57.91	9.083	1 56 45.3	58.87	16 3.93	64.46	6 1.02	0.773
Frid.	26	0 21 35.86	9.083	2 20 16.6	58.76	16 3.66	64.46	5 42.47	0.773
Sat.	27	0 25 13.81	9.083	2 43 44.8	58.63	16 3.38	64.46	5 23.91	0.773
Sun.	28	0 28 51.76	9.084	3 7 9.9	58.48	16 3.10	64.46	5 5.35	0.772
Mon.	29	0 32 29.75	9.086	3 30 31.3	58.33	16 2.82	64.47	4 46.84	0.770
Tues.	30	0 36 7.81	9.089	3 53 48.8	58.16	16 2.54	64.48	4 28.40	0.767
Wed.	31	0 39 45.96	9.093	4 17 1.9	57.97	16 2.26	64.49	4 10.05	0.763
Thur.	32	0 43 24.21	9.098	N. 4 40 10.5	57.77	16 1.98	64.51	3 51.81	0.758

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.18 from the Sidereal Time.



## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be subtracted from Mean Time.	Diff. for 1 hour.	Sidereal Time, or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.			
Mon.	1	<sup>h</sup> 22 <sup>m</sup> 49 <sup>s</sup> 48.72	9.351	S. <sup>°</sup> 7 <sup>'</sup> 27 <sup>"</sup> 8.0	57.05	<sup>m</sup> 12 <sup>s</sup> 30.07	0.504	<sup>h</sup> 22 <sup>m</sup> 37 <sup>s</sup> 18.65
Tues.	2	22 53 32.91	9.331	7 4 15.7	57.31	12 17.71	0.524	22 41 15.20
Wed.	3	22 57 16.63	9.312	6 41 17.2	57.55	12 4.88	0.544	22 45 11.75
Thur.	4	23 0 59.89	9.294	6 18 13.1	57.78	11 51.59	0.562	22 49 8.30
Frid.	5	23 4 42.73	9.277	5 55 3.7	57.99	11 37.88	0.579	22 53 4.85
Sat.	6	23 8 25.16	9.260	5 31 49.4	58.19	11 23.75	0.596	22 57 1.41
Sun.	7	23 12 7.21	9.244	5 8 30.5	58.37	11 9.25	0.612	23 0 57.96
Mon.	8	23 15 48.88	9.229	4 45 7.6	58.53	10 54.36	0.627	23 4 54.52
Tues.	9	23 19 30.19	9.214	4 21 41.0	58.68	10 39.12	0.642	23 8 51.07
Wed.	10	23 23 11.16	9.200	3 58 10.8	58.81	10 23.54	0.656	23 12 47.62
Thur.	11	23 26 51.81	9.187	3 34 37.8	58.93	10 7.64	0.669	23 16 44.17
Frid.	12	23 30 32.16	9.175	3 11 2.2	59.03	9 51.43	0.681	23 20 40.73
Sat.	13	23 34 12.22	9.163	2 47 24.4	59.11	9 34.94	0.693	23 24 37.28
Sun.	14	23 37 52.02	9.153	2 23 44.8	59.18	9 18.19	0.703	23 28 33.83
Mon.	15	23 41 31.56	9.143	2 0 3.9	59.23	9 1.18	0.713	23 32 30.38
Tues.	16	23 45 10.87	9.133	1 36 21.9	59.26	8 43.94	0.723	23 36 26.93
Wed.	17	23 48 49.95	9.124	1 12 39.3	59.28	8 26.46	0.732	23 40 23.49
Thur.	18	23 52 28.83	9.116	0 48 56.4	59.28	8 8.79	0.740	23 44 20.04
Frid.	19	23 56 7.52	9.109	0 25 13.7	59.27	7 50.93	0.747	23 48 16.59
Sat.	20	23 59 46.05	9.103	S. 0 1 31.6	59.24	7 32.91	0.753	23 52 13.14
Sun.	21	0 3 24.44	9.097	N. 0 22 9.8	59.20	7 14.75	0.759	23 56 9.69
Mon.	22	0 7 2.71	9.092	0 45 50.1	59.14	6 56.47	0.764	0 0 6.24
Tues.	23	0 10 40.88	9.088	1 9 28.6	59.06	6 38.08	0.768	0 4 2.80
Wed.	24	0 14 18.97	9.085	1 33 5.2	58.97	6 19.62	0.771	0 7 59.35
Thur.	25	0 17 56.99	9.083	1 56 39.4	58.87	6 1.09	0.773	0 11 55.90
Frid.	26	0 21 34.99	9.083	2 20 11.0	58.76	5 42.54	0.773	0 15 52.45
Sat.	27	0 25 12.99	9.083	2 43 39.6	58.63	5 23.98	0.773	0 19 49.01
Sun.	28	0 28 50.98	9.084	3 7 4.9	58.48	5 5.42	0.772	0 23 45.56
Mon.	29	0 32 29.02	9.086	3 30 26.6	58.33	4 46.91	0.770	0 27 42.11
Tues.	30	0 36 7.13	9.089	3 53 44.4	58.16	4 28.47	0.767	0 31 38.66
Wed.	31	0 39 45.33	9.093	4 16 57.9	57.97	4 10.12	0.763	0 35 35.21
Thur.	32	0 43 23.63	9.098	N. 4 40 6.8	57.77	3 51.86	0.758	0 39 31.77

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+9°.8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S					Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	60	340° 59' 15.6	59' 18.9	150.33	+0.38	9.9962757	46.3	<sup>h</sup> 1 <sup>m</sup> 22 <sup>s</sup> 27.80	
2	61	341 59 22.8	59 26.0	150.26	0.43	.9963879	46.9	1 18 31.90	
3	62	342 59 28.3	59 31.4	150.19	0.45	.9965013	47.5	1 14 36.00	
4	63	343 59 32.1	59 35.1	150.12	0.43	.9966162	48.0	1 10 40.09	
5	64	344 59 34.4	59 37.3	150.06	0.38	.9967322	48.5	1 6 44.18	
6	65	345 59 35.1	59 37.9	149.99	0.31	.9968491	48.9	1 2 48.27	
7	66	346 59 34.2	59 36.9	149.92	0.22	.9969668	49.2	0 58 52.36	
8	67	347 59 31.6	59 34.2	149.85	+0.11	.9970851	49.4	0 54 56.45	
9	68	348 59 27.4	59 29.9	149.79	—0.02	.9972040	49.6	0 51 0.55	
10	69	349 59 21.4	59 23.9	149.72	0.15	.9973233	49.7	0 47 4.65	
11	70	350 59 13.6	59 16.0	149.64	0.28	.9974427	49.8	0 43 8.75	
12	71	351 59 4.0	59 6.3	149.56	0.40	.9975623	49.9	0 39 12.84	
13	72	352 58 52.5	58 54.7	149.48	0.51	.9976820	49.9	0 35 16.93	
14	73	353 58 38.9	58 41.0	149.39	0.59	.9978017	49.9	0 31 21.02	
15	74	354 58 23.2	58 25.2	149.30	0.65	.9979215	49.9	0 27 25.11	
16	75	355 58 5.4	58 7.4	149.21	0.69	.9980413	49.9	0 23 29.20	
17	76	356 57 45.5	57 47.4	149.12	0.70	.9981611	49.9	0 19 33.30	
18	77	357 57 23.3	57 25.1	149.03	0.67	.9982809	50.0	0 15 37.39	
19	78	358 56 58.8	57 0.5	148.93	0.61	.9984010	50.1	0 11 41.48	
20	79	359 56 32.0	56 33.7	148.84	0.52	.9985214	50.2	0 7 45.57	
21	80	0 56 3.0	56 4.6	148.74	0.42	.9986422	50.4	{ 0 3 49.67 } 23 59 53.77	
22	81	1 55 31.6	55 33.1	148.64	0.30	.9987635	50.6	23 55 57.86	
23	82	2 54 57.8	54 59.2	148.54	0.17	.9988852	50.9	23 52 1.95	
24	83	3 54 21.7	54 23.0	148.45	—0.03	.9990075	51.1	23 48 6.05	
25	84	4 53 43.4	53 44.6	148.36	+0.11	.9991306	51.4	23 44 10.15	
26	85	5 53 2.9	53 4.1	148.27	0.22	.9992543	51.7	23 40 14.25	
27	86	6 52 20.3	52 21.4	148.18	0.32	.9993788	52.0	23 36 18.34	
28	87	7 51 35.7	51 36.7	148.09	0.41	.9995039	52.3	23 32 22.43	
29	88	8 50 49.0	50 50.0	148.01	0.47	.9996298	52.5	23 28 26.52	
30	89	9 50 0.3	50 1.2	147.93	0.49	.9997562	52.7	23 24 30.61	
31	90	10 49 9.7	49 10.5	147.86	0.48	9.9998832	52.9	23 20 34.70	
32	91	11 48 17.4	48 18.1	147.78	+0.44	0.0000106	53.1	23 16 38.80	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>s</sup> .830	

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.

## SEMI- DIAMETER.

## HORIZONTAL PARALLAX.

## MERIDIAN PASSAGE.

## AGE.

	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
1	16' 24.7	16' 17.7	60' 7.4	-2.05	59' 41.6	-2.22	<sup>h</sup> 15 <sup>m</sup> 28.4	<sup>m</sup> 2.20	<sup>d</sup> 17.9
2	16 10.2	16 2.4	59 14.1	2.33	58 45.7	2.38	16 20.8	2.18	18.9
3	15 54.6	15 46.9	58 16.9	2.39	57 48.4	2.34	17 12.8	2.16	19.9
4	15 39.3	15 32.1	57 20.6	2.26	56 54.1	2.15	18 4.6	2.15	20.9
5	15 25.2	15 18.9	56 29.0	2.02	56 5.6	1.87	18 55.9	2.12	21.9
6	15 13.0	15 7.7	55 44.2	1.71	55 24.7	1.54	19 46.4	2.08	22.9
7	15 3.0	14 58.8	55 7.3	1.36	54 51.9	1.20	20 35.8	2.03	23.9
8	14 55.2	14 52.1	54 38.5	1.03	54 27.2	0.87	21 23.7	1.96	24.9
9	14 49.5	14 47.4	54 17.7	0.71	54 10.1	0.56	22 10.0	1.90	25.9
10	14 45.8	14 44.7	54 4.3	0.41	54 0.2	0.28	22 54.7	1.84	26.9
11	14 44.0	14 43.7	53 57.5	-0.16	53 56.3	-0.04	23 38.1	1.79	27.9
12	14 43.7	14 44.1	53 56.5	+0.07	53 58.0	+0.18	δ		28.9
13	14 44.9	14 46.0	54 0.8	0.28	54 4.8	0.39	0 20.6	1.76	0.1
14	14 47.4	14 49.2	54 10.1	0.49	54 16.6	0.60	1 2.8	1.76	1.1
15	14 51.3	14 53.8	54 24.4	0.71	54 33.6	0.82	1 45.0	1.78	2.1
16	14 56.7	15 0.0	54 44.2	0.94	54 56.2	1.06	2 28.2	1.83	3.1
17	15 3.6	15 7.7	55 9.7	1.18	55 24.7	1.31	3 12.8	1.90	4.1
18	15 12.2	15 17.2	55 41.2	1.44	55 59.3	1.57	3 59.6	2.00	5.1
19	15 22.5	15 28.3	56 19.0	1.70	56 40.1	1.81	4 49.0	2.11	6.1
20	15 34.4	15 40.8	57 2.5	1.92	57 26.2	2.02	5 41.1	2.23	7.1
21	15 47.6	15 54.5	57 51.0	2.09	58 16.4	2.13	6 35.9	2.33	8.1
22	16 1.5	16 8.4	58 42.1	2.14	59 7.7	2.10	7 32.8	2.39	9.1
23	16 15.2	16 21.6	59 32.6	2.01	59 56.1	1.87	8 30.7	2.42	10.1
24	16 27.5	16 32.6	60 17.6	1.68	60 36.4	1.43	9 28.8	2.40	11.1
25	16 36.8	16 40.0	60 52.0	1.14	61 3.7	0.80	10 26.1	2.37	12.1
26	16 42.0	16 42.8	61 11.2	+0.42	61 13.9	+0.03	11 22.4	2.32	13.1
27	16 42.2	16 40.4	61 11.8	-0.37	61 4.9	-0.77	12 17.7	2.29	14.1
28	16 37.2	16 32.9	60 53.4	1.14	60 37.6	1.48	13 12.3	2.27	15.1
29	16 27.6	16 21.4	60 17.9	1.77	59 55.1	2.01	14 6.5	2.25	16.1
30	16 14.4	16 7.0	59 29.6	2.20	59 2.3	2.32	15 0.6	2.25	17.1
31	15 59.2	15 51.3	58 33.8	2.39	58 4.9	2.40	15 54.4	2.23	18.1
32	15 43.5	15 35.9	57 36.1	-2.37	57 8.0	-2.29	16 47.8	2.20	19.1

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 1.					WEDNESDAY 3.				
0	13 32 46.24	2.3093	S. 4 31' 22.1	12.158	0	15 22 2.35	2.2590	S. 13 6' 37.7	8.956
1	13 35 4.33	2.3008	4 43 30.3	12.115	1	15 24 17.87	2.2585	13 15 32.5	8.889
2	13 37 22.33	2.2993	4 55 35.9	12.071	2	15 26 33.37	2.2580	13 24 22.0	8.781
3	13 39 40.25	2.2979	5 7 38.9	12.026	3	15 28 48.84	2.2576	13 33 6.2	8.693
4	13 41 58.08	2.2965	5 19 39.1	11.980	4	15 31 4.28	2.2571	13 41 45.2	8.605
5	13 44 15.83	2.2951	5 31 36.5	11.933	5	15 33 19.69	2.2567	13 50 18.8	8.515
6	13 46 33.50	2.2938	5 43 31.0	11.884	6	15 35 35.08	2.2562	13 58 47.0	8.426
7	13 48 51.09	2.2925	5 55 22.6	11.835	7	15 37 50.44	2.2558	14 7 9.9	8.335
8	13 51 8.60	2.2912	6 7 11.2	11.784	8	15 40 5.78	2.2554	14 15 27.3	8.244
9	13 53 26.03	2.2899	6 18 56.7	11.732	9	15 42 21.09	2.2549	14 23 39.2	8.153
10	13 55 43.39	2.2887	6 30 39.1	11.679	10	15 44 36.37	2.2545	14 31 45.6	8.061
11	13 58 0.67	2.2875	6 42 18.2	11.625	11	15 46 51.63	2.2541	14 39 46.5	7.969
12	14 0 17.89	2.2863	6 53 54.0	11.569	12	15 49 6.86	2.2537	14 47 41.9	7.876
13	14 2 35.03	2.2852	7 5 26.5	11.513	13	15 51 22.07	2.2532	14 55 31.7	7.783
14	14 4 52.11	2.2841	7 16 55.5	11.455	14	15 53 37.25	2.2528	15 3 15.9	7.690
15	14 7 9.12	2.2830	7 28 21.1	11.396	15	15 55 52.41	2.2524	15 10 54.5	7.596
16	14 9 26.07	2.2819	7 39 43.1	11.336	16	15 58 7.54	2.2520	15 18 27.4	7.501
17	14 11 42.95	2.2809	7 51 1.5	11.276	17	16 0 22.65	2.2516	15 25 54.6	7.406
18	14 13 59.77	2.2799	8 2 16.2	11.214	18	16 2 37.73	2.2511	15 33 16.1	7.310
19	14 16 16.54	2.2789	8 13 27.2	11.151	19	16 4 52.79	2.2507	15 40 31.9	7.215
20	14 18 33.24	2.2779	8 24 34.4	11.088	20	16 7 7.82	2.2503	15 47 41.9	7.119
21	14 20 49.89	2.2770	8 35 37.7	11.023	21	16 9 22.83	2.2499	15 54 46.1	7.022
22	14 23 6.48	2.2761	8 46 37.1	10.957	22	16 11 37.81	2.2494	16 1 44.5	6.925
23	14 25 23.02	2.2752	S. 8 57 32.5	10.890	23	16 13 52.76	2.2490	S. 16 8 37.1	6.827
TUESDAY 2.					THURSDAY 4.				
0	14 27 39.51	2.2743	S. 9 8 23.9	10.823	0	16 16 7.68	2.2485	S. 16 15 23.8	6.730
1	14 29 55.94	2.2735	9 19 11.2	10.754	1	16 18 22.57	2.2480	16 22 4.7	6.632
2	14 32 12.33	2.2726	9 29 54.4	10.685	2	16 20 37.44	2.2475	16 28 39.7	6.533
3	14 34 28.66	2.2718	9 40 33.4	10.615	3	16 22 52.28	2.2471	16 35 8.7	6.434
4	14 36 44.95	2.2710	9 51 8.2	10.544	4	16 25 7.09	2.2466	16 41 31.8	6.335
5	14 39 1.19	2.2703	10 1 38.7	10.472	5	16 27 21.87	2.2461	16 47 48.9	6.236
6	14 41 17.38	2.2695	10 12 4.8	10.399	6	16 29 36.62	2.2456	16 54 0.0	6.136
7	14 43 33.53	2.2688	10 22 26.5	10.325	7	16 31 51.34	2.2451	17 0 5.2	6.036
8	14 45 49.64	2.2681	10 32 43.8	10.251	8	16 34 6.03	2.2446	17 6 4.4	5.936
9	14 48 5.70	2.2674	10 42 56.6	10.176	9	16 36 20.69	2.2440	17 11 57.6	5.836
10	14 50 21.72	2.2667	10 53 4.9	10.099	10	16 38 35.32	2.2435	17 17 44.7	5.735
11	14 52 37.71	2.2661	11 3 8.6	10.022	11	16 40 49.91	2.2429	17 23 25.8	5.634
12	14 54 53.66	2.2655	11 13 7.6	9.944	12	16 43 4.48	2.2423	17 29 0.8	5.533
13	14 57 9.57	2.2649	11 23 1.9	9.866	13	16 45 19.00	2.2418	17 34 29.7	5.431
14	14 59 25.44	2.2643	11 32 51.5	9.787	14	16 47 33.49	2.2413	17 39 52.6	5.330
15	15 1 41.28	2.2637	11 42 36.3	9.707	15	16 49 47.94	2.2405	17 45 9.3	5.228
16	15 3 57.08	2.2630	11 52 16.3	9.626	16	16 52 2.36	2.2399	17 50 19.9	5.126
17	15 6 12.85	2.2625	12 1 51.4	9.545	17	16 54 16.74	2.2393	17 55 24.4	5.024
18	15 8 28.59	2.2620	12 11 21.6	9.463	18	16 56 31.07	2.2386	18 0 22.7	4.921
19	15 10 44.20	2.2615	12 20 46.9	9.380	19	16 58 45.37	2.2379	18 5 14.9	4.819
20	15 12 59.96	2.2609	12 30 7.2	9.297	20	17 0 59.63	2.2372	18 10 1.0	4.716
21	15 15 15.60	2.2604	12 39 22.5	9.213	21	17 3 13.84	2.2365	18 14 40.9	4.613
22	15 17 31.21	2.2599	12 48 32.7	9.128	22	17 5 28.01	2.2358	18 19 14.6	4.510
23	15 19 46.79	2.2594	12 57 37.8	9.042	23	17 7 42.13	2.2350	18 23 42.1	4.407
24	15 22 2.35	2.2590	S. 13 6' 37.7	8.956	24	17 9 56.21	2.2343	S. 18 28 3.5	4.304

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 5.					SUNDAY 7.				
0	17 9 56.21	2.2343	S. 18° 28' 3.5"	4.304	0	18 55 51.87	2.1701	S. 19° 55' 42.9"	0.611
1	17 12 10.24	2.2334	18 32 18.6	4.900	1	18 58 2.01	2.1681	19 55 3.3	0.709
2	17 14 24.22	2.2326	18 36 27.5	4.097	2	19 0 12.04	2.1661	19 54 17.8	0.807
3	17 16 38.16	2.2318	18 40 30.2	3.993	3	19 2 21.95	2.1642	19 53 26.4	0.904
4	17 18 52.04	2.2310	18 44 26.7	3.890	4	19 4 31.74	2.1622	19 52 29.2	1.002
5	17 21 5.87	2.2301	18 48 17.0	3.786	5	19 6 41.41	2.1601	19 51 26.1	1.100
6	17 23 19.65	2.2292	18 52 1.1	3.682	6	19 8 50.96	2.1581	19 50 17.2	1.196
7	17 25 33.37	2.2283	18 55 38.9	3.579	7	19 11 0.39	2.1561	19 49 2.5	1.293
8	17 27 47.04	2.2273	18 59 10.5	3.475	8	19 13 9.69	2.1540	19 47 42.1	1.389
9	17 30 0.65	2.2264	19 2 35.9	3.371	9	19 15 18.87	2.1519	19 46 15.9	1.484
10	17 32 14.21	2.2254	19 5 55.1	3.267	10	19 17 27.92	2.1497	19 44 44.0	1.580
11	17 34 27.70	2.2244	19 9 8.0	3.163	11	19 19 36.84	2.1476	19 43 6.3	1.675
12	17 36 41.14	2.2234	19 12 14.7	3.059	12	19 21 45.63	2.1454	19 41 22.9	1.770
13	17 38 54.51	2.2223	19 15 15.2	2.956	13	19 23 54.29	2.1432	19 39 33.9	1.864
14	17 41 7.82	2.2212	19 18 9.4	2.852	14	19 26 2.82	2.1410	19 37 39.2	1.958
15	17 43 21.06	2.2201	19 20 57.4	2.748	15	19 28 11.21	2.1388	19 35 38.9	2.052
16	17 45 34.23	2.2190	19 23 39.2	2.644	16	19 30 19.47	2.1365	19 33 33.0	2.145
17	17 47 47.34	2.2179	19 26 14.7	2.540	17	19 32 27.60	2.1343	19 31 21.5	2.238
18	17 50 0.38	2.2167	19 28 44.0	2.437	18	19 34 35.59	2.1320	19 29 4.4	2.331
19	17 52 13.35	2.2155	19 31 7.1	2.333	19	19 36 43.44	2.1297	19 26 41.8	2.423
20	17 54 26.25	2.2143	19 33 24.0	2.229	20	19 38 51.16	2.1274	19 24 13.7	2.515
21	17 56 39.07	2.2131	19 35 34.7	2.126	21	19 40 58.74	2.1251	19 21 40.1	2.606
22	17 58 51.82	2.2118	19 37 39.1	2.022	22	19 43 6.17	2.1227	19 19 1.0	2.697
23	18 1 4.49	2.2105	S. 19 39 37.4	1.919	23	19 45 13.46	2.1204	S. 19 16 16.4	2.787
SATURDAY 6.					MONDAY 8.				
0	18 3 17.08	2.2092	S. 19 41 20.4	1.816	0	19 47 20.61	2.1180	S. 19 13 26.4	2.877
1	18 5 29.60	2.2079	19 43 15.3	1.713	1	19 49 27.62	2.1156	19 10 31.0	2.967
2	18 7 42.03	2.2065	19 44 55.0	1.610	2	19 51 34.49	2.1132	19 7 30.3	3.057
3	18 9 54.38	2.2051	19 46 28.5	1.507	3	19 53 41.21	2.1108	19 4 24.2	3.146
4	18 12 6.64	2.2037	19 47 55.8	1.404	4	19 55 47.79	2.1084	19 1 12.8	3.234
5	18 14 18.82	2.2022	19 49 17.0	1.301	5	19 57 54.22	2.1060	18 57 56.1	3.322
6	18 16 30.91	2.2008	19 50 32.0	1.199	6	20 0 0.51	2.1035	18 54 34.2	3.410
7	18 18 42.91	2.1992	19 51 40.9	1.097	7	20 2 6.65	2.1011	18 51 7.0	3.497
8	18 20 54.82	2.1977	19 52 43.6	0.994	8	20 4 12.64	2.0986	18 47 34.6	3.583
9	18 23 6.64	2.1961	19 53 40.2	0.892	9	20 6 18.48	2.0961	18 43 57.0	3.669
10	18 25 18.36	2.1946	19 54 30.7	0.791	10	20 8 24.18	2.0936	18 40 14.3	3.755
11	18 27 29.99	2.1929	19 55 15.1	0.689	11	20 10 29.72	2.0911	18 36 26.4	3.841
12	18 29 41.52	2.1914	19 55 53.4	0.588	12	20 12 35.11	2.0886	18 32 33.4	3.925
13	18 31 52.95	2.1898	19 56 25.7	0.487	13	20 14 40.35	2.0861	18 28 35.4	4.009
14	18 34 4.29	2.1881	19 56 51.9	0.386	14	20 16 45.44	2.0836	18 24 32.3	4.093
15	18 36 15.53	2.1864	19 57 12.0	0.285	15	20 18 50.38	2.0810	18 20 24.2	4.177
16	18 38 26.66	2.1847	19 57 26.1	0.185	16	20 20 55.17	2.0785	18 16 11.1	4.260
17	18 40 37.69	2.1829	19 57 34.2	0.084	17	20 22 59.80	2.0759	18 11 53.1	4.342
18	18 42 48.61	2.1812	19 57 36.2	0.016	18	20 25 4.28	2.0734	18 7 30.1	4.424
19	18 44 59.43	2.1794	19 57 32.2	0.116	19	20 27 8.61	2.0708	18 3 2.2	4.505
20	18 47 10.14	2.1776	19 57 22.3	0.215	20	20 29 12.78	2.0682	17 58 29.5	4.586
21	18 49 20.74	2.1757	19 57 6.4	0.315	21	20 31 16.80	2.0657	17 53 51.9	4.667
22	18 51 31.23	2.1739	19 56 44.5	0.414	22	20 33 20.66	2.0631	17 49 9.5	4.747
23	18 53 41.61	2.1720	19 56 16.7	0.513	23	20 35 24.37	2.0605	17 44 22.3	4.826
24	18 55 51.87	2.1701	S. 19 55 42.9	0.611	24	20 37 27.92	2.0580	S. 17 39 30.4	4.905

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 9.					THURSDAY 11.				
0	20 37 27.92	2.0580	S. 17° 39' 30.4"	4.905	0	22 13 21.69	1.9417	S. 12° 23' 26.9"	8.048
1	20 39 31.32	2.0554	17 34 33.7	4.883	1	22 15 18.13	1.9386	12 15 22.5	8.099
2	20 41 34.57	2.0528	17 29 32.4	5.061	2	22 17 14.45	1.9376	12 7 15.0	8.150
3	20 43 37.66	2.0502	17 24 26.4	5.138	3	22 19 10.65	1.9356	11 59 4.5	8.200
4	20 45 40.60	2.0477	17 19 15.8	5.215	4	22 21 6.72	1.9336	11 50 51.0	8.249
5	20 47 43.38	2.0451	17 14 0.6	5.292	5	22 23 2.68	1.9316	11 42 34.6	8.298
6	20 49 46.01	2.0425	17 8 40.8	5.368	6	22 24 58.52	1.9297	11 34 15.2	8.347
7	20 51 48.48	2.0399	17 3 16.5	5.443	7	22 26 54.24	1.9277	11 25 53.0	8.395
8	20 53 50.80	2.0374	16 57 47.7	5.517	8	22 28 49.85	1.9258	11 17 27.9	8.442
9	20 55 52.96	2.0348	16 52 14.4	5.592	9	22 30 45.34	1.9240	11 9 0.0	8.488
10	20 57 54.97	2.0322	16 46 36.7	5.665	10	22 32 40.72	1.9221	11 0 29.3	8.534
11	20 59 56.83	2.0296	16 40 54.6	5.738	11	22 34 35.99	1.9202	10 51 55.9	8.580
12	21 1 58.53	2.0271	16 35 8.2	5.811	12	22 36 31.15	1.9184	10 43 19.8	8.624
13	21 4 0.08	2.0245	16 29 17.4	5.883	13	22 38 26.20	1.9166	10 34 41.0	8.668
14	21 6 1.47	2.0220	16 23 22.3	5.954	14	22 40 21.15	1.9149	10 25 59.6	8.712
15	21 8 2.71	2.0194	16 17 22.9	6.025	15	22 42 15.99	1.9132	10 17 15.6	8.755
16	21 10 3.80	2.0169	16 11 19.3	6.096	16	22 44 10.73	1.9115	10 8 29.0	8.797
17	21 12 4.74	2.0143	16 5 11.4	6.166	17	22 46 5.37	1.9098	9 59 39.9	8.839
18	21 14 5.53	2.0118	15 58 59.4	6.235	18	22 47 59.91	1.9082	9 50 48.3	8.880
19	21 16 6.16	2.0093	15 52 43.2	6.304	19	22 49 54.35	1.9066	9 41 54.3	8.920
20	21 18 6.64	2.0068	15 46 22.9	6.372	20	22 51 48.70	1.9050	9 32 57.8	8.960
21	21 20 6.98	2.0043	15 39 58.6	6.439	21	22 53 42.95	1.9034	9 23 59.0	9.000
22	21 22 7.16	2.0018	15 33 30.2	6.506	22	22 55 37.11	1.9019	9 14 57.8	9.039
23	21 24 7.19	1.9993	S. 15° 26' 57.8"	6.573	23	22 57 31.18	1.9004	S. 9° 5' 54.3"	9.077
WEDNESDAY 10.					FRIDAY 12.				
0	21 26 7.07	1.9968	S. 15° 20' 21.5"	6.639	0	22 59 25.16	1.8989	S. 8° 56' 48.5"	9.114
1	21 28 6.81	1.9944	15 13 41.2	6.704	1	23 1 19.05	1.8975	8 47 40.5	9.151
2	21 30 6.40	1.9919	15 6 57.0	6.769	2	23 3 12.86	1.8961	8 38 30.3	9.188
3	21 32 5.84	1.9894	15 0 8.9	6.833	3	23 5 6.58	1.8947	8 29 18.0	9.224
4	21 34 5.13	1.9870	14 53 17.0	6.897	4	23 7 0.23	1.8934	8 20 3.5	9.258
5	21 36 4.28	1.9846	14 46 21.3	6.960	5	23 8 53.79	1.8921	8 10 47.0	9.292
6	21 38 3.29	1.9822	14 39 21.8	7.022	6	23 10 47.27	1.8908	8 1 28.4	9.326
7	21 40 2.15	1.9798	14 32 18.6	7.084	7	23 12 40.68	1.8895	7 52 7.8	9.360
8	21 42 0.87	1.9774	14 25 11.7	7.146	8	23 14 34.01	1.8883	7 42 45.2	9.392
9	21 43 59.45	1.9751	14 18 1.1	7.208	9	23 16 27.27	1.8871	7 33 20.7	9.424
10	21 45 57.88	1.9728	14 10 46.9	7.267	10	23 18 20.47	1.8860	7 23 54.3	9.456
11	21 47 56.18	1.9704	14 3 29.1	7.326	11	23 20 13.59	1.8848	7 14 26.1	9.487
12	21 49 54.33	1.9681	13 56 7.8	7.385	12	23 22 6.65	1.8837	7 4 56.0	9.517
13	21 51 52.35	1.9658	13 48 42.9	7.443	13	23 23 59.65	1.8827	6 55 24.1	9.546
14	21 53 50.23	1.9635	13 41 14.6	7.501	14	23 25 52.58	1.8817	6 45 50.5	9.575
15	21 55 47.97	1.9612	13 33 42.8	7.559	15	23 27 45.45	1.8807	6 36 15.1	9.603
16	21 57 45.58	1.9590	13 26 7.5	7.615	16	23 29 38.26	1.8798	6 26 38.1	9.631
17	21 59 43.05	1.9567	13 18 28.9	7.671	17	23 31 31.02	1.8788	6 16 59.4	9.658
18	22 1 40.39	1.9545	13 10 46.9	7.727	18	23 33 23.72	1.8780	6 7 19.1	9.684
19	22 3 37.60	1.9523	13 3 1.6	7.782	19	23 35 16.38	1.8771	5 57 37.2	9.710
20	22 5 34.67	1.9502	12 55 13.1	7.836	20	23 37 8.98	1.8763	5 47 53.8	9.735
21	22 7 31.62	1.9480	12 47 21.3	7.890	21	23 39 1.53	1.8755	5 38 8.9	9.760
22	22 9 28.44	1.9459	12 39 26.3	7.943	22	23 40 54.04	1.8748	5 28 22.6	9.784
23	22 11 25.13	1.9438	12 31 28.2	7.996	23	23 42 46.51	1.8740	5 18 34.8	9.807
24	22 13 21.69	1.9417	S. 12° 23' 26.9"	8.048	24	23 44 38.93	1.8734	S. 5° 8' 45.7"	9.830

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 13.					MONDAY 15.				
0	23 44 38.93	1.8734	S. 5 8 45.7	9.830	0	1 14 31.61	1.8870	N. 2 57 27.7	10.185
1	23 46 31.31	1.8737	4 58 55.2	9.853	1	1 16 24.87	1.8883	3 7 38.6	10.177
2	23 48 23.66	1.8731	4 49 3.4	9.874	2	1 18 18.20	1.8896	3 17 49.0	10.168
3	23 50 15.97	1.8716	4 39 10.3	9.895	3	1 20 11.61	1.8910	3 27 58.8	10.158
4	23 52 8.25	1.8711	4 29 15.9	9.915	4	1 22 5.11	1.8924	3 38 8.0	10.148
5	23 54 0.50	1.8706	4 19 20.4	9.935	5	1 23 58.70	1.8938	3 48 16.5	10.137
6	23 55 52.72	1.8701	4 9 23.7	9.954	6	1 25 52.37	1.8953	3 58 24.4	10.125
7	23 57 44.91	1.8697	3 59 25.9	9.973	7	1 27 46.13	1.8968	4 8 31.6	10.113
8	23 59 37.10	1.8693	3 49 27.0	9.991	8	1 29 39.99	1.8984	4 18 38.0	10.100
9	0 1 29.25	1.8690	3 39 27.1	10.008	9	1 31 33.94	1.9001	4 28 43.6	10.086
10	0 3 21.38	1.8687	3 29 26.1	10.024	10	1 33 27.99	1.9017	4 38 48.3	10.072
11	0 5 13.49	1.8684	3 19 24.2	10.040	11	1 35 22.15	1.9034	4 48 52.2	10.057
12	0 7 5.58	1.8682	3 9 21.3	10.055	12	1 37 16.41	1.9052	4 58 55.1	10.041
13	0 8 57.67	1.8680	2 59 17.5	10.070	13	1 39 10.78	1.9070	5 8 57.1	10.025
14	0 10 49.74	1.8679	2 49 12.9	10.084	14	1 41 5.25	1.9089	5 18 58.1	10.008
15	0 12 41.81	1.8677	2 39 7.4	10.098	15	1 42 59.84	1.9107	5 28 58.0	9.990
16	0 14 33.87	1.8677	2 29 1.2	10.110	16	1 44 54.54	1.9127	5 38 56.9	9.972
17	0 16 25.93	1.8677	2 18 54.2	10.122	17	1 46 49.36	1.9146	5 48 54.6	9.952
18	0 18 17.99	1.8677	2 8 46.5	10.134	18	1 48 44.30	1.9166	5 58 51.2	9.933
19	0 20 10.05	1.8677	1 58 38.1	10.145	19	1 50 39.36	1.9187	6 8 46.6	9.912
20	0 22 2.12	1.8678	1 48 29.1	10.155	20	1 52 34.54	1.9208	6 18 40.7	9.891
21	0 23 54.19	1.8680	1 38 19.5	10.165	21	1 54 29.85	1.9229	6 28 33.5	9.869
22	0 25 46.27	1.8681	1 28 9.3	10.174	22	1 56 25.29	1.9251	6 38 25.0	9.846
23	0 27 38.37	1.8683	S. 1 17 58.6	10.182	23	1 58 20.86	1.9273	N. 6 48 15.1	9.823
SUNDAY 14.					TUESDAY 16.				
0	0 29 30.48	1.8686	S. 1 7 47.4	10.190	0	2 0 16.56	1.9296	N. 6 58 3.7	9.799
1	0 31 22.61	1.8689	0 57 35.8	10.197	1	2 2 12.40	1.9319	7 7 50.9	9.775
2	0 33 14.75	1.8692	0 47 23.7	10.204	2	2 4 8.38	1.9342	7 17 36.6	9.749
3	0 35 6.91	1.8696	0 37 11.3	10.210	3	2 6 4.51	1.9366	7 27 20.8	9.723
4	0 36 59.10	1.8700	0 26 58.5	10.215	4	2 8 0.78	1.9390	7 37 3.4	9.696
5	0 38 51.32	1.8705	0 16 45.5	10.220	5	2 9 57.19	1.9415	7 46 44.4	9.669
6	0 40 43.56	1.8710	S. 0 6 32.2	10.224	6	2 11 53.75	1.9440	7 56 23.7	9.641
7	0 42 35.83	1.8715	N. 0 3 41.3	10.227	7	2 13 50.47	1.9465	8 6 1.3	9.612
8	0 44 28.14	1.8721	0 13 55.0	10.230	8	2 15 47.34	1.9491	8 15 37.1	9.582
9	0 46 20.48	1.8727	0 24 8.9	10.233	9	2 17 44.37	1.9518	8 25 11.1	9.552
10	0 48 12.86	1.8734	0 34 22.9	10.234	10	2 19 41.55	1.9544	8 34 43.3	9.521
11	0 50 5.29	1.8740	0 44 36.9	10.234	11	2 21 38.89	1.9571	8 44 13.6	9.489
12	0 51 57.75	1.8748	0 54 51.0	10.234	12	2 23 36.40	1.9599	8 53 41.9	9.456
13	0 53 50.26	1.8756	1 5 5.0	10.234	13	2 25 34.08	1.9627	9 3 8.3	9.423
14	0 55 42.82	1.8764	1 15 19.0	10.233	14	2 27 31.92	1.9655	9 12 32.7	9.389
15	0 57 35.43	1.8773	1 25 32.9	10.231	15	2 29 29.94	1.9684	9 21 55.0	9.354
16	0 59 28.09	1.8782	1 35 46.7	10.228	16	2 31 28.13	1.9713	9 31 15.2	9.318
17	1 1 20.81	1.8791	1 46 0.3	10.225	17	2 33 26.50	1.9742	9 40 33.2	9.282
18	1 3 13.58	1.8801	1 56 13.7	10.221	18	2 35 25.04	1.9772	9 49 49.0	9.245
19	1 5 6.42	1.8811	2 6 26.9	10.217	19	2 37 23.76	1.9803	9 59 2.6	9.208
20	1 6 59.32	1.8822	2 16 39.8	10.212	20	2 39 22.67	1.9833	10 8 13.9	9.169
21	1 8 52.29	1.8833	2 26 52.3	10.206	21	2 41 21.76	1.9864	10 17 22.9	9.130
22	1 10 45.32	1.8845	2 37 4.5	10.200	22	2 43 21.04	1.9896	10 26 29.5	9.090
23	1 12 38.43	1.8857	2 47 16.3	10.193	23	2 45 20.51	1.9928	10 35 33.7	9.049
24	1 14 31.61	1.8870	N. 2 57 27.7	10.185	24	2 47 20.17	1.9960	N. 10 44 35.4	9.008

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 17.					FRIDAY 19.				
0	2 47 20.17	1.9960	N.10° 44' 35.4"	9.008	0	4 27 27.49	2.1855	N.16° 54' 7.3"	6.075
1	2 49 20.03	1.9992	10 53 34.6	8.965	1	4 20 38.75	2.1899	17 0 9.4	5.994
2	2 51 20.08	2.0025	11 2 31.2	8.922	2	4 31 50.28	2.1943	17 6 6.6	5.911
3	2 53 20.33	2.0059	11 11 25.2	8.879	3	4 34 2.07	2.1988	17 11 58.7	5.828
4	2 55 20.78	2.0092	11 20 16.6	8.834	4	4 36 14.13	2.2032	17 17 45.9	5.744
5	2 57 21.44	2.0126	11 29 5.3	8.789	5	4 38 26.46	2.2076	17 23 28.0	5.659
6	2 59 22.30	2.0160	11 37 51.3	8.743	6	4 40 39.05	2.2121	17 29 5.0	5.573
7	3 1 23.36	2.0195	11 46 34.5	8.696	7	4 42 51.91	2.2166	17 34 36.8	5.487
8	3 3 24.64	2.0230	11 55 14.8	8.648	8	4 45 5.04	2.2210	17 40 3.4	5.399
9	3 5 26.13	2.0265	12 3 52.2	8.599	9	4 47 18.43	2.2254	17 45 24.7	5.311
10	3 7 27.83	2.0301	12 12 26.7	8.550	10	4 49 32.09	2.2299	17 50 40.7	5.222
11	3 9 29.74	2.0337	12 20 58.2	8.500	11	4 51 46.02	2.2344	17 55 51.3	5.132
12	3 11 31.87	2.0374	12 29 26.7	8.449	12	4 54 0.22	2.2388	18 0 56.5	5.041
13	3 13 34.22	2.0411	12 37 52.1	8.398	13	4 56 14.68	2.2433	18 5 56.2	4.949
14	3 15 36.80	2.0448	12 46 14.4	8.345	14	4 58 29.41	2.2477	18 10 50.4	4.857
15	3 17 39.60	2.0485	12 54 33.5	8.292	15	5 0 44.40	2.2521	18 15 39.1	4.764
16	3 19 42.62	2.0523	13 2 49.4	8.238	16	5 2 59.66	2.2565	18 20 22.1	4.670
17	3 21 45.87	2.0561	13 11 2.1	8.183	17	5 5 15.18	2.2609	18 24 59.4	4.575
18	3 23 49.35	2.0599	13 19 11.5	8.128	18	5 7 30.97	2.2653	18 29 31.0	4.479
19	3 25 53.05	2.0637	13 27 17.5	8.072	19	5 9 47.02	2.2696	18 33 56.9	4.383
20	3 27 56.99	2.0676	13 35 20.1	8.014	20	5 12 3.33	2.2740	18 38 16.9	4.285
21	3 30 1.16	2.0715	13 43 19.2	7.956	21	5 14 19.90	2.2784	18 42 31.1	4.187
22	3 32 5.57	2.0754	13 51 14.8	7.897	22	5 16 36.73	2.2827	18 46 39.4	4.088
23	3 34 10.22	2.0794	N.13 59 6.9	7.838	23	5 18 53.83	2.2870	N.18 50 41.7	3.988
THURSDAY 18.					SATURDAY 20.				
0	3 36 15.10	2.0834	N.14 6 55.3	7.777	0	5 21 11.18	2.2913	N.18 54 37.9	3.887
1	3 38 20.23	2.0875	14 14 40.1	7.716	1	5 23 28.79	2.2956	18 58 28.1	3.786
2	3 40 25.60	2.0915	14 22 21.2	7.654	2	5 25 46.66	2.2999	19 2 12.2	3.684
3	3 42 31.21	2.0956	14 29 58.6	7.591	3	5 28 4.78	2.3042	19 5 50.2	3.581
4	3 44 37.07	2.0997	14 37 32.1	7.527	4	5 30 23.16	2.3084	19 9 22.0	3.477
5	3 46 43.17	2.1038	14 45 1.8	7.462	5	5 32 41.79	2.3126	19 12 47.5	3.373
6	3 48 49.52	2.1079	14 52 27.6	7.397	6	5 35 0.67	2.3168	19 16 6.7	3.268
7	3 50 56.12	2.1120	14 59 49.5	7.331	7	5 37 19.80	2.3209	19 19 19.6	3.162
8	3 53 2.97	2.1162	15 7 7.3	7.264	8	5 39 39.18	2.3250	19 22 26.1	3.055
9	3 55 10.07	2.1204	15 14 21.1	7.196	9	5 41 58.81	2.3291	19 25 26.2	2.947
10	3 57 17.42	2.1247	15 21 30.8	7.127	10	5 44 18.68	2.3332	19 28 19.8	2.839
11	3 59 25.03	2.1289	15 28 36.3	7.057	11	5 46 38.79	2.3372	19 31 6.8	2.730
12	4 1 32.88	2.1332	15 35 37.7	6.987	12	5 48 59.15	2.3413	19 33 47.3	2.620
13	4 3 41.00	2.1375	15 42 34.8	6.915	13	5 51 19.75	2.3453	19 36 21.2	2.510
14	4 5 49.38	2.1418	15 49 27.6	6.843	14	5 53 40.59	2.3492	19 38 48.5	2.399
15	4 7 58.02	2.1461	15 56 16.0	6.770	15	5 56 1.66	2.3531	19 41 9.1	2.287
16	4 10 6.91	2.1504	16 3 0.0	6.696	16	5 58 22.97	2.3570	19 43 22.9	2.174
17	4 12 16.07	2.1547	16 9 39.5	6.621	17	6 0 44.51	2.3608	19 45 30.0	2.061
18	4 14 25.48	2.1591	16 16 14.5	6.546	18	6 3 6.27	2.3646	19 47 30.3	1.947
19	4 16 35.16	2.1635	16 22 45.0	6.470	19	6 5 28.26	2.3684	19 49 23.7	1.833
20	4 18 45.10	2.1678	16 29 10.9	6.392	20	6 7 50.48	2.3721	19 51 10.2	1.717
21	4 20 55.30	2.1722	16 35 32.1	6.314	21	6 10 12.92	2.3758	19 52 49.8	1.601
22	4 23 5.77	2.1766	16 41 48.6	6.235	22	6 12 35.57	2.3794	19 54 22.4	1.485
23	4 25 16.50	2.1810	16 48 0.4	6.156	23	6 14 58.44	2.3831	19 55 48.0	1.368
24	4 27 27.49	2.1855	N.16 54 7.3	6.075	24	6 17 21.53	2.3866	N.19 57 6.5	1.250



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 21.					TUESDAY 23.				
0	6 17 21.53	2.3886	N.19 57' 6.5"	1.950	0	8 14 57.73	2.4898	N.18 33' 12.5"	4.831
1	6 19 44.83	2.3901	19 58 17.9	1.131	1	8 17 27.14	2.4906	18 28 18.8	4.959
2	6 22 8.34	2.3936	19 59 22.2	1.012	2	8 19 56.59	2.4910	18 23 17.4	5.087
3	6 24 32.06	2.3970	20 0 19.4	0.893	3	8 22 26.07	2.4915	18 18 8.3	5.215
4	6 26 55.99	2.4004	20 1 9.4	0.773	4	8 24 55.57	2.4919	18 12 51.6	5.342
5	6 29 20.11	2.4037	20 1 52.1	0.652	5	8 27 25.10	2.4923	18 7 27.2	5.469
6	6 31 44.43	2.4069	20 2 27.6	0.531	6	8 29 54.64	2.4926	18 1 55.2	5.596
7	6 34 8.94	2.4101	20 2 55.8	0.409	7	8 32 24.20	2.4928	17 56 15.7	5.722
8	6 36 33.64	2.4133	20 3 16.7	0.287	8	8 34 53.77	2.4929	17 50 28.6	5.848
9	6 38 58.53	2.4164	20 3 30.2	0.164	9	8 37 23.35	2.4930	17 44 34.0	5.973
10	6 41 23.61	2.4195	20 3 36.4	0.041	10	8 39 52.93	2.4931	17 38 31.8	6.098
11	6 43 48.87	2.4225	20 3 35.1	0.083	11	8 42 22.52	2.4930	17 32 22.2	6.222
12	6 46 14.31	2.4254	20 3 26.4	0.207	12	8 44 52.10	2.4929	17 26 5.1	6.346
13	6 48 39.92	2.4283	20 3 10.2	0.332	13	8 47 21.68	2.4928	17 19 40.6	6.469
14	6 51 5.71	2.4311	20 2 46.6	0.457	14	8 49 51.24	2.4926	17 13 8.7	6.592
15	6 53 31.66	2.4339	20 2 15.4	0.582	15	8 52 20.79	2.4924	17 6 29.5	6.714
16	6 55 57.79	2.4366	20 1 36.7	0.708	16	8 54 50.32	2.4921	16 59 43.0	6.836
17	6 58 24.06	2.4392	20 0 50.4	0.834	17	8 57 19.84	2.4917	16 52 49.2	6.957
18	7 0 50.49	2.4417	19 59 56.6	0.960	18	8 59 49.33	2.4913	16 45 48.2	7.077
19	7 3 17.08	2.4443	19 58 55.2	1.087	19	9 2 18.80	2.4909	16 38 40.0	7.197
20	7 5 43.81	2.4468	19 57 46.2	1.214	20	9 4 48.24	2.4904	16 31 24.6	7.316
21	7 8 10.69	2.4492	19 56 29.6	1.341	21	9 7 17.65	2.4898	16 24 2.1	7.434
22	7 10 37.72	2.4515	19 55 5.3	1.469	22	9 9 47.02	2.4892	16 16 32.6	7.551
23	7 13 4.88	2.4538	N.19 53 33.3	1.597	23	9 12 16.35	2.4885	N.16 8 56.0	7.668
MONDAY 22.					WEDNESDAY 24.				
0	7 15 32.17	2.4560	N.19 51 53.6	1.725	0	9 14 45.64	2.4878	N.16 1 12.5	7.784
1	7 17 59.60	2.4582	19 50 6.2	1.854	1	9 17 14.88	2.4870	15 53 22.0	7.899
2	7 20 27.16	2.4603	19 48 11.1	1.983	2	9 19 44.08	2.4862	15 45 24.6	8.014
3	7 22 54.84	2.4623	19 46 8.2	2.112	3	9 22 13.23	2.4854	15 37 20.4	8.127
4	7 25 22.64	2.4643	19 43 57.6	2.241	4	9 24 42.33	2.4845	15 29 9.4	8.240
5	7 27 50.55	2.4662	19 41 39.3	2.370	5	9 27 11.37	2.4836	15 20 51.6	8.351
6	7 30 18.58	2.4680	19 39 13.2	2.500	6	9 29 40.36	2.4826	15 12 27.2	8.462
7	7 32 46.71	2.4698	19 36 39.3	2.629	7	9 32 9.29	2.4816	15 3 56.2	8.572
8	7 35 14.95	2.4715	19 33 57.6	2.759	8	9 34 38.16	2.4806	14 55 18.6	8.681
9	7 37 43.29	2.4731	19 31 8.2	2.889	9	9 37 6.96	2.4795	14 46 34.5	8.789
10	7 40 11.73	2.4747	19 28 11.0	3.019	10	9 39 35.70	2.4784	14 37 44.0	8.896
11	7 42 40.26	2.4762	19 25 6.0	3.149	11	9 42 4.37	2.4772	14 28 47.1	9.002
12	7 45 8.87	2.4776	19 21 53.1	3.278	12	9 44 32.96	2.4760	14 19 43.8	9.107
13	7 47 37.57	2.4790	19 18 32.5	3.408	13	9 47 1.48	2.4747	14 10 34.3	9.210
14	7 50 6.35	2.4803	19 15 4.1	3.538	14	9 49 29.93	2.4734	14 1 18.6	9.313
15	7 52 35.21	2.4815	19 11 27.9	3.668	15	9 51 58.30	2.4721	13 51 56.7	9.415
16	7 55 4.14	2.4827	19 7 43.9	3.798	16	9 54 26.59	2.4708	13 42 28.7	9.516
17	7 57 33.14	2.4838	19 3 52.1	3.928	17	9 56 54.80	2.4695	13 32 54.8	9.615
18	8 0 2.20	2.4849	18 59 52.6	4.057	18	9 59 22.93	2.4681	13 23 14.9	9.713
19	8 2 31.32	2.4859	18 55 45.3	4.186	19	10 1 50.98	2.4667	13 13 29.2	9.810
20	8 5 0.50	2.4868	18 51 30.2	4.316	20	10 4 18.94	2.4653	13 3 37.7	9.906
21	8 7 29.74	2.4876	18 47 7.4	4.445	21	10 6 46.82	2.4639	12 53 40.5	10.001
22	8 9 59.02	2.4884	18 42 36.8	4.574	22	10 9 14.61	2.4624	12 43 37.6	10.094
23	8 12 28.35	2.4891	18 37 58.5	4.703	23	10 11 42.31	2.4609	12 33 29.2	10.187
24	8 14 57.73	2.4896	N.18 33 12.5	4.831	24	10 14 9.91	2.4593	N.12 23 15.3	10.278

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 25.					SATURDAY 27.				
0	10 14 9.91	2.4583	N. 12° 23' 15.3"	10.278	0	12 10 19.61	2.3823	N. 2° 52' 13.4"	12.918
1	10 16 37.42	2.4578	12 12 55.9	10.367	1	12 12 42.51	2.3810	2 39 17.8	12.934
2	10 19 4.84	2.4562	12 2 31.2	10.456	2	12 15 5.33	2.3797	2 26 21.3	12.948
3	10 21 32.17	2.4546	11 52 1.2	10.543	3	12 17 28.07	2.3784	2 13 24.1	12.960
4	10 23 59.40	2.4531	11 41 26.0	10.629	4	12 19 50.73	2.3771	2 0 26.2	12.970
5	10 26 26.54	2.4515	11 30 45.7	10.713	5	12 22 13.32	2.3758	1 47 27.7	12.979
6	10 28 53.58	2.4499	11 20 0.4	10.796	6	12 24 35.83	2.3746	1 34 28.7	12.987
7	10 31 20.52	2.4483	11 9 10.2	10.878	7	12 26 58.27	2.3734	1 21 29.3	12.992
8	10 33 47.37	2.4466	10 58 15.1	10.958	8	12 29 20.64	2.3722	1 8 29.6	12.996
9	10 36 14.12	2.4450	10 47 15.2	11.037	9	12 31 42.94	2.3710	0 55 29.7	12.998
10	10 38 40.77	2.4433	10 36 10.6	11.115	10	12 34 5.17	2.3698	0 42 29.8	12.999
11	10 41 7.32	2.4416	10 25 1.4	11.191	11	12 36 27.32	2.3687	0 29 29.8	12.998
12	10 43 33.77	2.4399	10 13 47.7	11.266	12	12 38 49.41	2.3676	0 16 30.0	12.996
13	10 46 0.12	2.4383	10 2 29.5	11.339	13	12 41 11.44	2.3665	N. 0 3 30.4	12.992
14	10 48 26.36	2.4366	9 51 7.0	11.411	14	12 43 33.40	2.3655	S. 0 9 29.0	12.988
15	10 50 52.50	2.4349	9 39 40.2	11.481	15	12 45 55.30	2.3644	0 22 28.0	12.978
16	10 53 18.54	2.4332	9 28 9.2	11.550	16	12 48 17.14	2.3634	0 35 26.4	12.969
17	10 55 44.48	2.4315	9 16 34.2	11.617	17	12 50 38.92	2.3624	0 48 24.3	12.958
18	10 58 10.32	2.4298	9 4 55.1	11.683	18	12 53 0.63	2.3614	1 1 21.4	12.946
19	11 0 36.06	2.4281	8 53 12.2	11.748	19	12 55 22.29	2.3605	1 14 17.8	12.932
20	11 3 1.69	2.4263	8 41 25.4	11.810	20	12 57 43.89	2.3596	1 27 13.3	12.917
21	11 5 27.22	2.4247	8 29 34.9	11.872	21	13 0 5.44	2.3586	1 40 7.8	12.900
22	11 7 52.65	2.4230	8 17 40.8	11.932	22	13 2 26.93	2.3577	1 53 1.2	12.881
23	11 10 17.98	2.4213	N. 8 5 43.1	11.990	23	13 4 48.37	2.3569	S. 2 5 53.5	12.861
FRIDAY 26.					SUNDAY 28.				
0	11 12 43.20	2.4196	N. 7 53 42.0	12.047	0	13 7 9.75	2.3561	S. 2 18 44.5	12.839
1	11 15 8.33	2.4179	7 41 37.5	12.102	1	13 9 31.09	2.3553	2 31 34.1	12.815
2	11 17 33.35	2.4162	7 29 29.8	12.155	2	13 11 52.38	2.3545	2 44 22.3	12.790
3	11 19 58.27	2.4146	7 17 18.9	12.207	3	13 14 13.63	2.3537	2 57 9.0	12.764
4	11 22 23.10	2.4129	7 5 5.0	12.258	4	13 16 34.83	2.3530	3 9 54.0	12.736
5	11 24 47.82	2.4112	6 52 48.1	12.305	5	13 18 55.98	2.3522	3 22 37.3	12.706
6	11 27 12.45	2.4096	6 40 28.3	12.352	6	13 21 17.09	2.3515	3 35 18.8	12.675
7	11 29 36.98	2.4080	6 28 5.8	12.398	7	13 23 38.16	2.3508	3 47 58.4	12.643
8	11 32 1.41	2.4063	6 15 40.6	12.442	8	13 25 59.19	2.3501	4 0 36.0	12.609
9	11 34 25.74	2.4047	6 3 12.8	12.484	9	13 28 20.18	2.3495	4 13 11.5	12.573
10	11 36 49.98	2.4031	5 50 42.5	12.525	10	13 30 41.13	2.3489	4 25 44.8	12.536
11	11 39 14.12	2.4015	5 38 9.9	12.564	11	13 33 2.04	2.3483	4 38 15.8	12.497
12	11 41 38.16	2.3999	5 25 34.9	12.601	12	13 35 22.92	2.3477	4 50 44.4	12.457
13	11 44 2.11	2.3984	5 12 57.7	12.637	13	13 37 43.77	2.3471	5 3 10.6	12.416
14	11 46 25.97	2.3968	5 0 18.5	12.671	14	13 40 4.58	2.3466	5 15 34.3	12.373
15	11 48 49.73	2.3953	4 47 37.3	12.703	15	13 42 25.36	2.3461	5 27 55.4	12.329
16	11 51 13.40	2.3938	4 34 54.2	12.733	16	13 44 46.11	2.3456	5 40 13.8	12.284
17	11 53 36.98	2.3923	4 22 9.3	12.762	17	13 47 6.83	2.3451	5 52 29.4	12.237
18	11 56 0.47	2.3908	4 9 22.7	12.790	18	13 49 27.52	2.3446	6 4 42.2	12.188
19	11 58 23.87	2.3893	3 56 34.5	12.815	19	13 51 48.18	2.3441	6 16 52.0	12.138
20	12 0 47.19	2.3879	3 43 44.8	12.839	20	13 54 8.82	2.3437	6 28 58.8	12.087
21	12 3 10.42	2.3864	3 30 53.8	12.862	21	13 56 29.43	2.3433	6 41 2.5	12.035
22	12 5 33.57	2.3850	3 18 1.5	12.882	22	13 58 50.01	2.3429	6 53 3.0	11.981
23	12 7 56.63	2.3836	3 5 8.0	12.901	23	14 1 10.57	2.3425	7 5 0.1	11.925
24	12 10 19.61	2.3823	N. 2 52 13.4	12.918	24	14 3 31.11	2.3421	S. 7 16 53.9	11.868

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
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MONDAY 29.

0	14 3 31.11	2.3421	S. 7 16 53.9	11.868
1	14 5 51.63	2.3417	7 28 44.3	11.811
2	14 8 12.13	2.3413	7 40 31.2	11.752
3	14 10 32.61	2.3411	7 52 14.5	11.692
4	14 12 53.06	2.3408	8 3 54.2	11.630
5	14 15 13.50	2.3405	8 15 30.1	11.567
6	14 17 33.91	2.3402	8 27 2.3	11.503
7	14 19 54.31	2.3399	8 38 30.6	11.438
8	14 22 14.69	2.3396	8 49 54.9	11.372
9	14 24 35.06	2.3393	9 1 15.2	11.304
10	14 26 55.41	2.3391	9 12 31.4	11.235
11	14 29 15.75	2.3388	9 23 43.5	11.165
12	14 31 36.07	2.3386	9 34 51.3	11.094
13	14 33 56.38	2.3384	9 45 54.9	11.022
14	14 36 16.68	2.3382	9 56 54.1	10.949
15	14 38 36.96	2.3380	10 7 48.8	10.875
16	14 40 57.23	2.3378	10 18 39.0	10.799
17	14 43 17.48	2.3375	10 29 24.7	10.722
18	14 45 37.73	2.3373	10 40 5.7	10.645
19	14 47 57.96	2.3371	10 50 42.0	10.566
20	14 50 18.18	2.3369	11 1 13.6	10.487
21	14 52 38.39	2.3367	11 11 40.4	10.406
22	14 54 58.59	2.3365	11 22 2.4	10.325
23	14 57 18.78	2.3363	S. 11 32 19.5	10.243

TUESDAY 30.

0	14 59 38.95	2.3361	S. 11 42 31.6	10.159
1	15 1 59.11	2.3359	11 52 38.6	10.075
2	15 4 19.26	2.3357	12 2 40.5	9.989
3	15 6 39.40	2.3355	12 12 37.3	9.903
4	15 8 59.52	2.3353	12 22 28.9	9.816
5	15 11 19.63	2.3351	12 32 15.2	9.728
6	15 13 39.73	2.3349	12 41 56.2	9.639
7	15 15 59.82	2.3347	12 51 31.9	9.549
8	15 18 19.89	2.3345	13 1 2.2	9.458
9	15 20 39.95	2.3343	13 10 27.0	9.368
10	15 23 0.00	2.3340	13 19 46.3	9.276
11	15 25 20.03	2.3337	13 29 0.1	9.183
12	15 27 40.05	2.3335	13 38 8.2	9.089
13	15 30 0.05	2.3332	13 47 10.7	8.994
14	15 32 20.03	2.3329	13 56 7.5	8.899
15	15 34 40.00	2.3326	14 4 58.6	8.804
16	15 36 59.95	2.3324	14 13 44.0	8.707
17	15 39 19.88	2.3321	14 22 23.5	8.610
18	15 41 39.80	2.3317	14 30 57.2	8.512
19	15 43 59.69	2.3314	14 39 25.0	8.414
20	15 46 19.57	2.3311	14 47 46.9	8.315
21	15 48 39.42	2.3307	14 56 2.8	8.215
22	15 50 59.25	2.3303	15 4 12.7	8.115
23	15 53 19.06	2.3299	15 12 16.5	8.014
24	15 55 38.84	2.3295	S. 15 20 14.3	7.912

WEDNESDAY 31.

0	15 55 38.84	2.3295	S. 15 20 14.3	7.912
1	15 57 58.60	2.3291	15 28 6.0	7.810
2	16 0 18.33	2.3286	15 35 51.5	7.707
3	16 2 38.03	2.3282	15 43 30.9	7.604
4	16 4 57.71	2.3277	15 51 4.1	7.501
5	16 7 17.35	2.3272	15 58 31.0	7.397
6	16 9 36.97	2.3267	16 5 51.7	7.293
7	16 11 56.55	2.3261	16 13 6.1	7.187
8	16 14 16.10	2.3255	16 20 14.2	7.082
9	16 16 35.62	2.3250	16 27 15.9	6.976
10	16 18 55.10	2.3243	16 34 11.3	6.870
11	16 21 14.54	2.3237	16 41 0.3	6.763
12	16 23 33.95	2.3231	16 47 42.8	6.656
13	16 25 53.32	2.3224	16 54 19.0	6.549
14	16 28 12.64	2.3217	17 0 48.7	6.441
15	16 30 31.92	2.3209	17 7 11.9	6.333
16	16 32 51.15	2.3202	17 13 28.7	6.225
17	16 35 10.34	2.3194	17 19 38.9	6.116
18	16 37 29.48	2.3186	17 25 42.6	6.007
19	16 39 48.57	2.3177	17 31 39.8	5.898
20	16 42 7.61	2.3169	17 37 30.4	5.789
21	16 44 26.59	2.3160	17 43 14.4	5.679
22	16 46 45.52	2.3150	17 48 51.9	5.569
23	16 49 4.39	2.3141	S. 17 54 22.7	5.459

THURSDAY, APRIL, 1.

0	16 51 23.21	2.3131	S. 17 59 46.9	5.349
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PHASES OF THE MOON.

- ☾ Last Quarter, . . . d h m  
● New Moon, . . . 12 20 46.6  
☽ First Quarter, . . . 20 17 54.0  
○ Full Moon, . . . 27 9 32.7

- ☾ Apogee, . . . . . d h  
☾ Perigee, . . . . . 26 12.8

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
1	Pollux W.	91° 8' 58"	2218	92° 56' 59"	2235	94° 44' 35"	2251	96° 31' 47"	2268
	Mars W.	63 39 33	2086	65 30 53	2101	67 21 49	2118	69 12 20	2136
	Regulus W.	55 13 8	2165	57 2 28	2182	58 51 23	2198	60 39 53	2215
	Antares E.	45 42 54	2286	43 56 34	2311	42 10 50	2337	40 25 44	2364
	Saturn E.	53 30 21	2186	51 41 33	2203	49 53 10	2220	48 5 12	2237
	α Aquilæ E.	93 31 49	2694	91 55 1	2710	90 18 34	2726	88 42 29	2744
	SUN E.	137 37 20	2480	135 55 38	2496	134 14 19	2514	132 33 25	2532
2	Pollux W.	105 21 13	2360	107 5 45	2379	108 49 50	2399	110 33 26	2419
	Mars W.	78 18 27	2223	80 6 21	2241	81 53 48	2259	83 40 48	2277
	Regulus W.	69 35 58	2303	71 21 53	2322	73 7 21	2340	74 52 22	2359
	Spica W.	17 8 1	2652	18 45 45	2612	20 24 23	2587	22 3 36	2571
	Antares E.	31 51 1	2535	30 10 37	2579	28 31 13	2629	26 52 57	2684
	Saturn E.	39 12 1	2330	37 26 45	2349	35 41 57	2368	33 57 37	2389
	α Aquilæ E.	80 48 23	2850	79 15 0	2874	77 42 8	2901	76 9 50	2927
	SUN E.	124 15 17	2626	122 36 57	2646	120 59 4	2668	119 21 38	2685
3	Mars W.	92 29 1	2371	94 13 18	2389	95 57 9	2407	97 40 34	2426
	Regulus W.	83 30 47	2452	85 13 8	2470	86 55 4	2439	88 36 33	2507
	Spica W.	30 22 30	2568	32 2 9	2576	33 41 37	2586	35 20 51	2596
	α Aquilæ E.	68 37 18	3080	67 8 44	3115	65 40 53	3151	64 13 45	3188
	SUN E.	111 21 4	2785	109 46 17	2805	108 11 55	2825	106 37 59	2845
4	Regulus W.	96 57 43	2596	98 36 43	2613	100 15 20	2630	101 53 34	2647
	Spica W.	43 33 8	2680	45 10 42	2673	46 47 58	2687	48 24 55	2701
	α Aquilæ E.	57 9 53	3404	55 47 41	3454	54 26 25	3506	53 6 7	3562
	SUN E.	98 54 38	2941	97 23 11	2960	95 52 8	2978	94 21 28	2997
5	Spica W.	56 25 2	2771	58 0 8	2785	59 34 56	2798	61 9 27	2811
	Antares W.	13 35 10	4020	14 46 30	3787	16 1 46	3815	17 20 4	3489
	SUN E.	86 53 42	3083	85 25 12	3101	83 57 3	3116	82 29 13	3133
6	Spica W.	68 57 47	2673	70 30 40	2686	72 3 17	2698	73 35 39	2709
	Antares W.	24 17 14	3193	25 43 32	3168	27 10 20	3148	28 37 31	3132
	SUN E.	75 14 43	3206	73 48 41	3220	72 22 55	3232	70 57 24	3246
7	Spica W.	81 14 7	2959	82 45 11	2969	84 16 3	2977	85 46 44	2987
	Antares W.	35 56 52	3098	37 25 4	3096	38 53 18	3095	40 21 34	3095
	Saturn W.	26 16 21	2966	27 47 16	2973	29 18 3	2980	30 48 41	2986
	SUN E.	63 53 30	3304	62 29 23	3315	61 5 29	3325	59 41 46	3335
8	Spica W.	93 17 33	3025	94 47 15	3032	96 16 48	3039	97 46 13	3044
	Antares W.	47 42 44	3101	49 10 53	3103	50 38 59	3105	52 7 3	3106
	Saturn W.	38 19 47	3018	39 49 37	3024	41 19 20	3030	42 48 56	3035
	SUN E.	52 45 54	3379	51 23 13	3386	50 0 40	3393	48 38 16	3400
9	Spica W.	105 11 32	3072	106 40 16	3076	108 8 55	3081	109 37 28	3085
	Antares W.	59 26 45	3117	60 54 34	3119	62 22 20	3120	63 50 5	3123
	Saturn W.	50 15 23	3058	51 44 24	3061	53 13 21	3065	54 42 13	3068
	SUN E.	41 48 9	3431	40 26 28	3437	39 4 53	3442	37 43 24	3446
10	Antares W.	71 8 18	3129	72 35 52	3130	74 3 25	3131	75 30 57	3132
	Saturn W.	62 5 42	3081	63 34 15	3082	65 2 46	3084	66 31 15	3085
	SUN E.	30 57 19	3470	29 36 21	3474	28 15 28	3479	26 54 40	3483

## GREENWICH MEAN TIME:

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Pollux W.	98° 18' 33"	2286	100° 4' 53"	2304	101° 50' 47"	2322	103° 36' 14"	2342
	Mars W.	71 2 25	2152	72 52 5	2169	74 41 19	2187	76 30 6	2204
	Regulus W.	62 27 58	2233	64 15 37	2249	66 2 51	2268	67 49 38	2286
	Antares E.	38 41 17	2393	36 57 32	2424	35 14 32	2459	33 32 21	2495
	Saturn E.	46 17 40	2256	44 30 35	2273	42 43 56	2292	40 57 45	2311
	α Aquilæ E.	87 6 47	2763	85 31 29	2783	83 56 40	2804	82 22 17	2826
	Sun E.	130 52 56	2551	129 12 53	2569	127 33 15	2588	125 54 3	2607
2	Pollux W.	112 16 34	2439	113 59 13	2460	115 41 23	2481	117 23 3	2499
	Mars W.	85 27 21	2296	87 13 27	2315	88 59 5	2333	90 44 17	2352
	Regulus W.	76 36 56	2377	78 21 4	2396	80 4 45	2415	81 47 59	2433
	Spica W.	23 43 11	2562	25 22 58	2558	27 2 51	2559	28 42 43	2562
	Antares E.	25 15 56	2747	23 40 19	2821	22 6 18	2806	20 34 7	3012
	Saturn E.	32 13 47	2410	30 30 26	2431	28 47 35	2452	27 5 14	2474
	α Aquilæ E.	74 38 6	2956	73 6 58	2985	71 36 26	3015	70 6 32	3047
	Sun E.	117 44 38	2705	116 8 5	2725	114 31 58	2745	112 56 18	2765
3	Mars W.	99 23 32	2444	101 6 4	2462	102 48 10	2480	104 29 51	2479
	Regulus W.	90 17 37	2525	91 58 16	2543	93 38 30	2561	95 18 19	2579
	Spica W.	36 59 51	2607	38 38 36	2620	40 17 4	2632	41 55 15	2646
	α Aquilæ E.	62 47 22	2827	61 21 45	2869	59 56 57	2919	58 32 59	2957
	Sun E.	105 4 29	2864	103 31 24	2883	101 58 44	2903	100 26 29	2922
4	Regulus W.	103 31 25	2663	105 8 54	2681	106 46 0	2696	108 22 45	2712
	Spica W.	50 1 34	2715	51 37 54	2729	53 13 55	2734	54 49 38	2757
	α Aquilæ E.	51 46 51	2820	50 28 38	2863	49 11 33	2919	47 55 38	2980
	Sun E.	92 51 11	3015	91 21 17	3032	89 51 44	3050	88 22 33	3066
5	Spica W.	62 43 40	2825	64 17 36	2838	65 51 15	2848	67 24 40	2862
	Antares W.	18 40 40	3395	20 3 2	3323	21 26 47	3268	22 51 36	3226
	Sun E.	81 1 43	3148	79 34 31	3163	78 7 38	3178	76 41 2	3192
6	Spica W.	75 7 47	2919	76 39 42	2930	78 11 23	2940	79 42 51	2950
	Antares W.	30 5 2	3121	31 32 46	3112	33 0 41	3106	34 28 43	3101
	Sun E.	69 32 9	3258	68 7 8	3270	66 42 22	3282	65 17 50	3293
7	Spica W.	87 17 13	2994	88 47 33	3003	90 17 42	3010	91 47 42	3018
	Antares W.	41 49 50	3095	43 18 6	3096	44 46 21	3097	46 14 34	3100
	Saturn W.	32 19 11	2993	33 49 32	3000	35 19 45	3006	36 49 50	3013
	Sun E.	58 18 15	3344	56 54 54	3353	55 31 44	3362	54 8 44	3371
8	Spica W.	99 15 31	3051	100 44 41	3058	102 13 45	3062	103 42 41	3066
	Antares W.	53 35 5	3109	55 3 4	3111	56 31 0	3113	57 58 54	3115
	Saturn W.	44 18 25	3040	45 47 48	3045	47 17 5	3049	48 46 17	3054
	Sun E.	47 16 0	3407	45 53 51	3414	44 31 50	3420	43 9 56	3426
9	Spica W.	111 5 56	3089	112 34 19	3093	114 2 37	3096	115 30 51	3099
	Antares W.	65 17 47	3124	66 45 27	3126	68 13 5	3127	69 40 42	3128
	Saturn W.	56 11 2	3071	57 39 47	3074	59 8 28	3077	60 37 6	3078
	Sun E.	36 22 0	3452	35 0 42	3456	33 39 29	3461	32 18 21	3466
10	Antares W.	76 58 28	3133	78 25 58	3133	79 53 27	3133	81 20 56	3133
	Saturn W.	67 59 43	3087	69 28 9	3087	70 56 34	3088	72 24 58	3089
	Sun E.	25 33 57	3488	24 13 19	3491	22 52 45	3496	21 32 16	3503

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
15	SUN	W.	23° 45' 55"	3413	25° 7' 57"	3405	26° 30' 8"	3396	27° 52' 29"	3387
	Aldebaran	E.	49 26 46	3001	47 56 35	2997	46 26 19	2991	44 55 55	2986
	Pollux	E.	93 35 46	3053	92 6 39	3047	90 37 25	3043	89 8 5	3038
	Mars	E.	117 54 11	2962	116 23 11	2958	114 52 5	2953	113 20 53	2947
16	SUN	W.	34 46 38	3346	36 9 56	3338	37 33 24	3329	38 57 2	3321
	Aldebaran	E.	37 22 15	2957	35 51 8	2950	34 19 53	2944	32 48 30	2937
	Pollux	E.	81 39 45	3009	80 9 43	3003	78 39 34	2996	77 9 16	2990
	Mars	E.	105 43 11	2920	104 11 17	2914	102 39 16	2908	101 7 7	2901
	Regulus	E.	117 31 3	2956	115 59 55	2950	114 28 39	2942	112 57 14	2936
17	SUN	W.	45 57 43	3276	47 22 23	3265	48 47 15	3255	50 12 19	3246
	Jupiter	W.	23 4 42	3030	24 34 17	3018	26 4 8	3004	27 34 16	2991
	Aldebaran	E.	25 9 16	2998	23 36 55	2991	22 4 24	2983	20 31 43	2974
	Pollux	E.	69 35 48	2957	68 4 41	2949	66 33 24	2942	65 1 58	2935
	Mars	E.	93 24 10	2966	91 51 7	2957	90 17 53	2949	88 44 29	2941
	Regulus	E.	105 17 54	2998	103 45 32	2988	102 12 58	2980	100 40 14	2972
18	SUN	W.	57 20 41	3191	58 47 1	3179	60 13 35	3168	61 40 23	3155
	Jupiter	W.	35 8 56	2928	36 40 39	2916	38 12 38	2903	39 44 53	2891
	α Arietis	W.	24 26 22	3845	25 40 38	3726	26 56 58	3600	28 15 11	3538
	Pollux	E.	57 22 26	2996	55 50 2	2989	54 17 29	2981	52 44 46	2973
	Mars	E.	80 54 40	2795	79 20 6	2785	77 45 19	2775	76 10 19	2766
	Regulus	E.	92 53 34	2923	91 19 36	2912	89 45 24	2901	88 10 58	2790
19	SUN	W.	68 58 11	3090	70 26 33	3077	71 55 11	3062	73 24 7	3048
	Jupiter	W.	47 30 10	2925	49 4 5	2912	50 38 17	2796	52 12 47	2785
	α Arietis	W.	35 8 4	3206	36 34 6	3158	38 1 5	3115	39 28 56	3075
	Pollux	E.	44 58 46	2937	43 25 6	2931	41 51 19	2925	40 17 24	2921
	Mars	E.	68 11 50	2710	66 35 24	2698	64 58 41	2686	63 21 42	2674
	Regulus	E.	80 15 1	2731	78 39 2	2719	77 2 47	2705	75 26 14	2692
20	SUN	W.	80 53 17	2973	82 24 4	2957	83 55 11	2941	85 26 38	2924
	α Arietis	W.	46 59 35	2908	48 31 44	2890	50 4 29	2852	51 37 50	2825
	Pollux	E.	32 26 43	2815	30 52 34	2819	29 18 31	2808	27 44 39	2841
	Mars	E.	55 12 36	2609	53 33 53	2596	51 54 53	2583	50 15 34	2569
	Regulus	E.	67 19 0	2623	65 40 36	2609	64 1 53	2593	62 22 49	2578
21	SUN	W.	93 9 7	2842	94 42 41	2824	96 16 38	2807	97 50 57	2789
	α Arietis	W.	59 32 54	2704	61 9 29	2682	62 46 34	2660	64 24 8	2638
	Aldebaran	W.	26 7 42	2502	27 48 53	2486	29 30 26	2470	31 12 22	2455
	Mars	E.	41 54 10	2498	40 12 54	2485	38 31 19	2470	36 49 24	2457
	Regulus	E.	54 2 15	2501	52 21 3	2485	50 39 20	2469	48 57 32	2453
	Spica	E.	107 45 30	2534	106 5 4	2517	104 24 15	2501	102 43 3	2485
22	SUN	W.	105 48 14	2703	107 24 50	2685	109 1 50	2669	110 39 12	2651
	α Arietis	W.	72 39 8	2536	74 19 31	2517	76 0 20	2499	77 41 35	2480
	Aldebaran	W.	39 47 45	2371	41 32 1	2356	43 16 39	2339	45 1 42	2323
	Regulus	E.	40 22 5	2372	38 37 50	2355	36 53 11	2339	35 8 9	2323
	Spica	E.	94 11 13	2401	92 27 40	2385	90 43 44	2368	88 59 24	2353
23	SUN	W.	118 51 51	2567	120 31 31	2551	122 11 33	2536	123 51 56	2520
	α Arietis	W.	86 14 9	2395	87 57 51	2379	89 41 56	2364	91 26 23	2349
	Aldebaran	W.	53 52 48	2243	55 40 11	2228	57 27 57	2213	59 16 5	2197
	Regulus	E.	26 17 6	2244	24 29 44	2229	22 42 0	2214	20 53 54	2200

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
15	Sun	W.	29 15 0	3379	30 37 40	3371	32 0 30	3362	33 23 30	3355
	Aldebaran	E.	43 25 25	2981	41 54 49	2974	40 24 4	2969	38 53 13	2964
	Pollux	E.	87 38 39	3052	86 9 6	3026	84 39 26	3021	83 9 39	3015
	Mars	E.	111 49 34	2942	110 18 9	2937	108 46 37	2931	107 14 58	2925
16	Sun	W.	40 20 49	3312	41 44 47	3303	43 8 55	3294	44 33 14	3285
	Aldebaran	E.	31 16 58	2930	29 45 17	2922	28 13 26	2915	26 41 26	2907
	Pollux	E.	75 38 51	2983	74 8 17	2977	72 37 36	2970	71 6 46	2964
	Mars	E.	99 34 49	2994	98 2 23	2987	96 29 48	2980	94 57 4	2973
	Regulus	E.	111 25 41	2928	109 53 58	2922	108 22 7	2914	106 50 6	2905
17	Sun	W.	51 37 34	3225	53 3 2	3225	54 28 42	3214	55 54 35	3203
	Jupiter	W.	29 4 40	2978	30 35 20	2965	32 6 16	2954	33 37 27	2939
	Aldebaran	E.	18 58 51	2964	17 25 46	2956	15 52 31	2947	14 19 4	2938
	Pollux	E.	63 30 23	2927	61 58 38	2920	60 26 44	2912	58 54 40	2904
	Mars	E.	87 10 54	2932	85 37 8	2924	84 3 11	2915	82 29 2	2905
	Regulus	E.	99 7 19	2922	97 34 12	2912	96 0 52	2902	94 27 19	2893
18	Sun	W.	63 7 26	3143	64 34 44	3130	66 2 17	3117	67 30 6	3104
	Jupiter	W.	41 17 23	2978	42 50 10	2966	44 23 13	2954	45 56 33	2939
	α Arietis	W.	29 35 4	3448	30 56 26	3378	32 19 8	3314	33 43 3	3258
	Pollux	E.	51 11 53	2986	49 38 50	2959	48 5 38	2951	46 32 16	2945
	Mars	E.	74 35 6	2755	72 59 39	2744	71 23 57	2733	69 48 1	2722
	Regulus	E.	86 36 17	2779	85 1 21	2767	83 26 10	2755	81 50 43	2744
19	Sun	W.	74 53 20	3034	76 22 51	3018	77 52 41	3004	79 22 49	2987
	Jupiter	W.	53 47 35	2770	55 22 42	2756	56 58 8	2741	58 33 53	2726
	α Arietis	W.	40 57 36	3038	42 27 2	3002	43 57 12	2969	45 28 4	2938
	Pollux	E.	38 43 23	2917	37 9 17	2914	35 35 7	2912	34 0 55	2912
	Mars	E.	61 44 27	2961	60 6 55	2949	58 29 6	2938	56 51 0	2923
	Regulus	E.	73 49 24	2978	72 12 15	2965	70 34 48	2952	68 57 4	2938
20	Sun	W.	86 58 26	2908	88 30 35	2892	90 3 4	2875	91 35 55	2859
	α Arietis	W.	53 11 46	2799	54 46 15	2775	56 21 16	2750	57 56 49	2726
	Pollux	E.	26 11 4	2957	24 37 50	2929	23 5 8	2915	21 33 8	2901
	Mars	E.	48 35 56	2955	46 55 59	2940	45 15 42	2927	43 35 6	2912
	Regulus	E.	60 43 24	2964	59 3 39	2948	57 23 32	2933	55 43 4	2917
21	Sun	W.	99 25 39	2772	101 0 44	2755	102 36 11	2738	104 12 1	2720
	α Arietis	W.	66 2 12	2917	67 40 44	2896	69 19 44	2876	70 59 12	2856
	Aldebaran	W.	32 54 39	2937	34 37 21	2921	36 20 26	2905	38 3 54	2889
	Mars	E.	35 7 10	2943	33 24 36	2930	31 41 44	2917	29 58 33	2904
	Regulus	E.	47 15 13	2936	45 32 30	2921	43 49 25	2905	42 5 57	2888
	Spica	E.	101 1 28	2967	99 19 29	2951	97 37 7	2935	95 54 22	2918
22	Sun	W.	112 16 58	2934	113 55 7	2916	115 33 40	2900	117 12 35	2885
	α Arietis	W.	79 23 16	2962	81 5 22	2945	82 47 53	2927	84 30 49	2910
	Aldebaran	W.	46 47 8	2907	48 32 58	2891	50 19 11	2874	52 5 48	2859
	Regulus	E.	33 22 43	2907	31 36 54	2891	29 50 41	2875	28 4 5	2860
	Spica	E.	87 14 42	2936	85 29 35	2921	83 44 6	2905	81 53 14	2889
23	Sun	W.	125 32 41	2905	127 13 47	2901	128 55 13	2977	130 36 59	2963
	α Arietis	W.	93 11 11	2935	94 56 19	2922	96 41 47	2909	98 27 33	2897
	Aldebaran	W.	61 4 37	2184	62 53 29	2169	64 42 43	2155	66 32 18	2142
	Regulus	E.	19 5 26	2186	17 16 37	2172	15 27 28	2159	13 37 59	2147

GREENWICH MEAN TIME.										
LUNAR DISTANCES.										
Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
23	Spica	E.	80° 11' 59"	2274	78° 25' 22"	2259	76° 38' 22"	2245	74° 51' 1"	2230
24	Aldebaran	W.	68 22 13	2128	70 12 29	2116	72 3 3	2104	73 53 57	2092
	Pollux	W.	25 37 36	2399	27 21 12	2354	29 5 53	2316	30 51 29	2282
	Spica	E.	65 49 6	2165	63 59 46	2153	62 10 8	2143	60 20 14	2132
	Antares	E.	111 38 55	2194	109 50 19	2180	108 1 21	2167	106 12 4	2153
	Saturn	E.	120 55 54	2136	119 5 49	2122	117 15 24	2110	115 24 40	2098
25	Aldebaran	W.	83 12 39	2041	85 5 9	2033	86 57 52	2025	88 50 48	2017
	Pollux	W.	39 50 12	2163	41 39 36	2145	43 29 27	2130	45 19 40	2116
	Spica	E.	51 7 8	2092	49 15 56	2086	47 24 36	2082	45 33 9	2079
	Antares	E.	97 0 56	2099	95 9 55	2090	93 18 40	2083	91 27 14	2074
	Saturn	E.	106 6 39	2046	104 14 16	2038	102 21 41	2030	100 28 53	2023
26	Aldebaran	W.	98 17 56	1992	100 11 43	1988	102 5 36	1986	103 59 33	1984
	Pollux	W.	54 35 23	2068	56 27 12	2061	58 19 11	2055	60 11 19	2052
	Mars	W.	30 44 25	2020	32 37 28	2014	34 30 40	2010	36 23 58	2007
	Regulus	W.	18 9 26	1994	20 3 9	1991	21 56 58	1989	23 50 50	1987
	Spica	E.	36 15 18	2083	34 23 53	2090	32 32 38	2098	30 41 36	2110
	Antares	E.	82 7 35	2051	80 15 20	2048	78 23 1	2047	76 30 40	2046
	Saturn	E.	91 2 25	1996	89 8 45	1993	87 15 0	1991	85 21 12	1990
27	Pollux	W.	69 32 54	2048	71 25 14	2049	73 17 32	2052	75 9 45	2056
	Mars	W.	45 51 9	2007	47 44 32	2010	49 37 51	2014	51 31 4	2018
	Regulus	W.	33 20 24	1991	35 14 12	1994	37 7 56	1998	39 1 34	2003
	Antares	E.	67 9 15	2059	65 17 12	2064	63 25 17	2070	61 33 32	2078
	Saturn	E.	75 52 4	1994	73 58 21	1998	72 4 43	2002	70 11 12	2007
	α Aquilæ	E.	112 44 47	2023	111 6 23	2011	109 27 43	2000	107 48 48	2002
28	Pollux	W.	84 28 54	2088	86 20 12	2098	88 11 15	2106	90 2 5	2117
	Mars	W.	60 54 58	2053	62 47 10	2062	64 39 8	2072	66 30 50	2083
	Regulus	W.	48 27 28	2037	50 20 4	2046	52 12 26	2057	54 4 32	2067
	Antares	E.	52 18 12	2132	50 28 1	2146	48 38 12	2162	46 48 47	2178
	Saturn	E.	60 45 52	2042	58 53 24	2052	57 1 10	2062	55 9 12	2072
	α Aquilæ	E.	99 32 29	2084	97 53 12	2089	96 14 2	2095	94 35 0	2093
29	Pollux	W.	99 11 48	2180	101 0 46	2195	102 49 21	2210	104 37 33	2227
	Mars	W.	75 44 57	2145	77 34 47	2160	79 24 15	2174	81 13 21	2190
	Regulus	W.	63 20 42	2128	65 10 58	2143	67 0 52	2157	68 50 24	2172
	Antares	E.	37 48 53	2290	36 2 39	2320	34 17 8	2351	32 32 23	2385
	Saturn	E.	45 53 49	2136	44 3 45	2150	42 14 2	2166	40 24 43	2182
	α Aquilæ	E.	86 23 13	2066	84 45 47	2083	83 8 44	2101	81 32 6	2122
30	Mars	W.	90 12 51	2273	91 59 30	2291	93 45 42	2309	95 31 28	2328
	Regulus	W.	77 52 15	2253	79 39 23	2270	81 26 6	2289	83 12 22	2307
	Spica	W.	24 52 56	2417	26 36 6	2416	28 19 18	2417	30 2 28	2423
	α Aquilæ	E.	73 36 19	2845	72 2 50	2876	70 30 0	2907	68 57 50	2939
	Fomalhaut	E.	106 52 27	2534	105 12 1	2547	103 31 53	2561	101 52 4	2574
31	Mars	W.	104 13 31	2423	105 56 33	2442	107 39 8	2462	109 21 15	2482
	Regulus	W.	91 57 8	2398	93 40 45	2417	95 23 55	2436	97 6 38	2455
	Spica	W.	38 35 36	2474	40 17 26	2487	41 58 57	2502	43 40 8	2517
	α Aquilæ	E.	61 28 2	3131	60 0 31	3178	58 33 55	3225	57 8 15	3275
	Fomalhaut	E.	93 38 12	2657	92 0 34	2675	90 23 21	2694	88 46 35	2713
	Sun	E.	130 37 7	2739	129 1 19	2759	127 25 57	2779	125 51 1	2798



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XV <sup>h</sup> .	P. L. of Diff.	XVIII <sup>h</sup> .	P. L. of Diff.	XXI <sup>h</sup> .	P. L. of Diff.
23	Spica	E.	73° 3' 18"	2216	71° 15' 15"	2202	69° 26' 51"	2190	67° 38' 8"	2177
24	Aldebaran	W.	75 45 8	2081	77 36 37	2070	79 28 22	2060	81 20 23	2050
	Pollux	W.	32 37 55	2253	34 25 4	2226	36 12 53	2203	38 1 16	2181
	Spica	E.	58 30 4	2122	56 39 39	2114	54 49 1	2105	52 58 10	2098
	Antares	E.	104 22 25	2141	102 32 28	2130	100 42 14	2118	98 51 43	2108
	Saturn	E.	113 33 37	2086	111 42 17	2075	109 50 40	2065	107 58 47	2055
25	Aldebaran	W.	90 43 55	2011	92 37 12	2005	94 30 39	2000	96 24 14	1995
	Pollux	W.	47 10 15	2104	49 1 8	2092	50 52 19	2083	52 43 44	2074
	Spica	E.	43 41 37	2077	41 50 3	2076	39 58 27	2076	38 6 51	2078
	Antares	E.	89 35 35	2068	87 43 47	2062	85 51 50	2058	83 59 46	2053
	Saturn	E.	98 35 54	2016	96 42 45	2010	94 49 26	2005	92 55 59	2000
26	Aldebaran	W.	105 53 32	1983	107 47 33	1984	109 41 33	1984	111 35 32	1983
	Pollux	W.	62 3 32	2049	63 55 50	2048	65 48 10	2046	67 40 32	2046
	Mars	W.	38 17 21	2005	40 10 47	2004	42 4 15	2004	43 57 43	2005
	Regulus	W.	25 44 45	1986	27 38 41	1986	29 32 37	1987	31 26 32	1989
	Spica	E.	28 50 52	2125	27 0 31	2146	25 10 42	2170	23 21 29	2202
	Antares	E.	74 38 18	2048	72 45 58	2048	70 53 39	2051	69 1 24	2055
	Saturn	E.	83 27 22	1989	81 33 31	1989	79 39 40	1991	77 45 51	1992
27	Pollux	W.	77 1 52	2061	78 53 52	2066	80 45 43	2073	82 37 24	2080
	Mars	W.	53 24 10	2023	55 17 8	2030	57 9 56	2037	59 2 33	2044
	Regulus	W.	40 55 4	2006	42 48 26	2014	44 41 38	2021	46 34 39	2029
	Antares	E.	59 41 59	2086	57 50 38	2096	55 59 33	2106	54 8 43	2118
	Saturn	E.	68 17 48	2012	66 24 33	2010	64 31 28	2026	62 38 34	2033
	α Aquilæ	E.	106° 9' 42"	2586	104 30 28	2583	102 51 10	2581	101 11 49	2582
28	Pollux	W.	91 52 38	2126	93 42 55	2141	95 32 52	2153	97 22 31	2167
	Mars	W.	68 22 16	2094	70 13 25	2106	72 4 15	2118	73 54 46	2132
	Regulus	W.	55 56 22	2078	57 47 55	2090	59 39 10	2102	61 30 6	2115
	Antares	E.	44 59 47	2197	43 11 15	2218	41 23 14	2240	39 35 46	2264
	Saturn	E.	53 17 30	2084	51 26 6	2096	49 35 0	2109	47 44 14	2122
	α Aquilæ	E.	92 56 9	2612	91 17 31	2623	89 39 7	2635	88 1 0	2650
29	Pollux	W.	106 25 21	2242	108 12 46	2260	109 59 44	2277	111 46 17	2295
	Mars	W.	83 2 4	2206	84 50 23	2223	86 38 17	2239	88 25 47	2256
	Regulus	W.	70 39 34	2188	72 28 20	2203	74 16 43	2220	76 4 41	2236
	Antares	E.	30 48 27	2426	29 5 29	2471	27 23 35	2521	25 42 51	2580
	Saturn	E.	38 35 48	2198	36 47 17	2215	34 59 12	2233	33 11 33	2251
	α Aquilæ	E.	79 55 56	2744	78 20 14	2767	76 45 3	2792	75 10 24	2818
30	Mars	W.	97 16 47	2246	99 1 39	2365	100 46 4	2384	102 30 1	2403
	Regulus	W.	84 58 12	2324	86 43 36	2343	88 28 33	2361	90 13 4	2380
	Spica	W.	31 45 30	2429	33 28 23	2438	35 11 3	2450	36 53 27	2460
	α Aquilæ	E.	67 26 21	2974	65 55 36	3010	64 25 36	3049	62 56 24	3090
	Fomalhaut	E.	110 12 34	2590	98 33 25	2606	96 54 38	2622	95 16 13	2640
31	Mars	W.	111 2 54	2501	112 44 6	2520	114 24 51	2540	116 5 9	2560
	Regulus	W.	98 48 54	2475	100 30 43	2493	102 12 6	2512	103 53 2	2531
	Spica	W.	45 20 58	2533	47 1 26	2548	48 41 32	2564	50 21 16	2581
	α Aquilæ	E.	55 43 34	3328	54 19 55	3384	52 57 21	3444	51 35 54	3508
	Fomalhaut	E.	87 10 11	2733	85 34 15	2753	83 58 46	2774	82 23 44	2795
	SUN	E.	124 16 31	2818	122 42 27	2838	121 8 48	2858	119 35 35	2878

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sideral Time of the Semi-diameter passing the Meridian.	Equation of Time, to be added to		Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.	subtracted from Apparent Time.				
Thur.	1	<sup>h</sup> 0 <sup>m</sup> 43 <sup>s</sup> 24.21	9.098	N. 4° 40' 10.5"	57.77	16' 1.98"	64.51	<sup>m</sup> 3 <sup>s</sup> 51.81	<sup>s</sup>		
Frid.	2	0 47 2.60	9.104	5 3 14.0	57.55	16 1.69	64.53	3 33.69	0.752		
Sat.	3	0 50 41.13	9.111	5 26 12.2	57.32	16 1.40	64.55	3 15.72	0.745		
Sun.	4	0 54 19.84	9.118	5 49 4.9	57.08	16 1.12	64.57	2 57.93	0.738		
Mon.	5	0 57 58.74	9.126	6 11 51.6	56.83	16 0.84	64.60	2 40.32	0.730		
Tues.	6	1 1 37.83	9.135	6 34 32.0	56.56	16 0.56	64.63	2 22.91	0.721		
Wed.	7	1 5 17.15	9.145	6 57 5.8	56.28	16 0.28	64.66	2 5.72	0.711		
Thur.	8	1 8 56.71	9.155	7 19 32.6	55.98	16 0.01	64.69	1 48.78	0.701		
Frid.	9	1 12 36.54	9.166	7 41 52.1	55.67	15 59.73	64.73	1 32.10	0.690		
Sat.	10	1 16 16.63	9.177	8 4 3.8	55.34	15 59.46	64.77	1 15.68	0.679		
Sun.	11	1 19 56.99	9.189	8 26 7.6	54.99	15 59.19	64.81	0 59.54	0.667		
Mon.	12	1 23 37.64	9.202	8 48 2.9	54.63	15 58.52	64.85	0 43.68	0.654		
Tues.	13	1 27 18.61	9.215	9 9 49.5	54.25	15 58.65	64.90	0 28.14	0.641		
Wed.	14	1 30 59.90	9.229	9 31 26.9	53.86	15 58.38	64.95	0 12.92	0.627		
Thur.	15	1 34 41.53	9.243	9 52 54.9	53.46	15 58.12	65.00	0 1.96	0.613		
Frid.	16	1 38 23.50	9.258	10 14 13.1	53.04	15 57.86	65.06	0 16.50	0.598		
Sat.	17	1 42 5.82	9.273	10 35 21.0	52.61	15 57.60	65.11	0 30.70	0.583		
Sun.	18	1 45 48.51	9.288	10 56 18.3	52.17	15 57.34	65.17	0 44.53	0.568		
Mon.	19	1 49 31.58	9.304	11 17 4.8	51.71	15 57.08	65.23	0 57.98	0.552		
Tues.	20	1 53 15.04	9.321	11 37 40.1	51.24	15 56.83	65.29	1 11.03	0.535		
Wed.	21	1 56 58.93	9.339	11 58 3.9	50.75	15 56.58	65.35	1 23.66	0.517		
Thur.	22	2 0 43.25	9.357	12 18 16.0	50.25	15 56.33	65.42	1 35.86	0.499		
Frid.	23	2 4 28.01	9.376	12 38 15.9	49.73	15 56.08	65.49	1 47.62	0.480		
Sat.	24	2 8 13.23	9.395	12 58 3.3	49.20	15 55.83	65.56	1 58.93	0.461		
Sun.	25	2 11 58.91	9.415	13 17 37.7	48.66	15 55.58	65.63	2 9.77	0.441		
Mon.	26	2 15 45.07	9.435	13 36 59.0	48.11	15 55.34	65.70	2 20.13	0.421		
Tues.	27	2 19 31.74	9.456	13 56 7.0	47.55	15 55.09	65.77	2 29.99	0.400		
Wed.	28	2 23 18.92	9.477	14 15 1.3	46.97	15 54.85	65.85	2 39.34	0.379		
Thur.	29	2 27 6.62	9.499	14 33 41.5	46.38	15 54.60	65.92	2 48.17	0.357		
Frid.	30	2 30 54.85	9.522	14 52 7.4	45.78	15 54.36	66.00	2 56.47	0.334		
Sat.	31	2 34 43.64	9.545	N. 15 10 18.8	45.16	15 54.12	66.08	3 4.21	0.311		

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.18 from the Sideral Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be subtracted from		Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	added to Mean Time.			
Thur.	1	<sup>h</sup> 0 <sup>m</sup> 43 <sup>s</sup> 23.63	9.098	N. <sup>°</sup> 4 <sup>'</sup> 40 <sup>"</sup> 6.8	57.77	<sup>m</sup> 3 <sup>s</sup> 51.86	<sup>s</sup> 0.758	<sup>h</sup> 0 <sup>m</sup> 39 <sup>s</sup> 31.77	
Frid.	2	0 47 2.06	9.104	5 3 10.6	57.55	3 33.74	0.752	0 43 28.32	
Sat.	3	0 50 40.64	9.111	5 26 9.1	57.32	3 15.76	0.745	0 47 24.88	
Sun.	4	0 54 19.39	9.118	5 49 2.1	57.08	2 57.97	0.738	0 51 21.42	
Mon.	5	0 57 58.33	9.126	6 11 49.1	56.83	2 40.35	0.730	0 55 17.98	
Tues.	6	1 1 37.47	9.135	6 34 29.8	56.56	2 22.94	0.721	0 59 14.53	
Wed.	7	1 5 16.83	9.145	6 57 3.9	56.28	2 5.75	0.711	1 3 11.08	
Thur.	8	1 8 56.44	9.155	7 19 30.9	55.98	1 48.81	0.701	1 7 7.63	
Frid.	9	1 12 36.31	9.166	7 41 50.7	55.67	1 32.12	0.690	1 11 4.19	
Sat.	10	1 16 16.44	9.177	8 4 2.7	55.34	1 15.70	0.679	1 15 0.74	
Sun.	11	1 19 56.84	9.189	8 26 6.7	54.99	0 59.55	0.667	1 18 57.29	
Mon.	12	1 23 37.53	9.202	8 48 2.3	54.63	0 43.69	0.654	1 22 53.84	
Tues.	13	1 27 18.54	9.215	9 9 49.1	54.25	0 28.14	0.641	1 26 50.40	
Wed.	14	1 30 59.87	9.229	9 31 26.7	53.86	0 12.92	0.627	1 30 46.95	
Thur.	15	1 34 41.54	9.243	9 52 54.9	53.46	0 1.96	0.613	1 34 43.50	
Frid.	16	1 38 23.55	9.258	10 14 13.3	53.04	0 16.50	0.598	1 38 40.05	
Sat.	17	1 42 5.91	9.273	10 35 21.4	52.61	0 30.70	0.583	1 42 36.61	
Sun.	18	1 45 48.63	9.288	10 56 18.9	52.17	0 44.53	0.568	1 46 33.16	
Mon.	19	1 49 31.73	9.304	11 17 5.6	51.71	0 57.98	0.552	1 50 29.71	
Tues.	20	1 53 15.23	9.321	11 37 41.1	51.24	1 11.04	0.535	1 54 26.27	
Wed.	21	1 56 59.15	9.339	11 58 5.1	50.75	1 23.67	0.517	1 58 22.82	
Thur.	22	2 0 43.50	9.357	12 18 17.3	50.25	1 35.87	0.499	2 2 19.37	
Frid.	23	2 4 28.29	9.376	12 38 17.4	49.73	1 47.64	0.480	2 6 15.93	
Sat.	24	2 8 13.54	9.395	12 58 4.9	49.20	1 58.94	0.461	2 10 12.48	
Sun.	25	2 11 59.25	9.415	13 17 39.5	48.66	2 9.79	0.441	2 14 9.04	
Mon.	26	2 15 45.44	9.435	13 37 0.9	48.11	2 20.15	0.421	2 18 5.59	
Tues.	27	2 19 32.13	9.456	13 56 9.0	47.55	2 30.01	0.400	2 22 2.14	
Wed.	28	2 23 19.33	9.477	14 15 3.4	46.97	2 39.37	0.379	2 25 58.70	
Thur.	29	2 27 7.06	9.499	14 33 43.7	46.38	2 48.19	0.357	2 29 55.25	
Frid.	30	2 30 55.32	9.522	14 52 9.7	45.78	2 56.49	0.334	2 33 51.81	
Sat.	31	2 34 44.13	9.545	N. 15 10 21.1	45.16	3 4.23	0.311	2 37 48.36	

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+9°.8565

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+9°.8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.	
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	91	11° 48' 17.4	48' 18.1	147.78	+0.44	0.0000106	53.1	23 <sup>h</sup> 16 <sup>m</sup> 38.80 <sup>s</sup>	
2	92	12 47 23.3	47 23.9	147.71	0.39	.0001383	53.2	23 12 42.89	
3	93	13 46 27.5	46 28.0	147.64	0.30	.0002660	53.2	23 8 46.99	
4	94	14 45 29.8	45 30.2	147.56	0.19	.0003937	53.1	23 4 51.08	
5	95	15 44 30.4	44 30.7	147.49	+0.06	.0005212	53.0	23 0 55.17	
6	96	16 43 29.2	43 29.4	147.42	-0.07	.0006484	52.9	22 56 59.27	
7	97	17 42 26.3	42 26.4	147.35	0.20	.0007751	52.6	22 53 3.36	
8	98	18 41 21.5	41 21.5	147.27	0.33	.0009011	52.3	22 49 7.45	
9	99	19 40 14.8	40 14.7	147.19	0.45	.0010262	51.9	22 45 11.55	
10	100	20 39 6.3	39 6.1	147.11	0.54	.0011504	51.5	22 41 15.64	
11	101	21 37 55.9	37 55.6	147.03	0.60	.0012736	51.1	22 37 19.73	
12	102	22 36 43.5	36 43.1	146.94	0.64	.0013958	50.7	22 33 23.83	
13	103	23 35 29.1	35 28.6	146.86	0.65	.0015170	50.3	22 29 27.92	
14	104	24 34 12.7	34 12.1	146.77	0.63	.0016370	49.8	22 25 32.02	
15	105	25 32 54.1	32 53.4	146.68	0.59	.0017560	49.4	22 21 36.11	
16	106	26 31 33.3	31 32.5	146.59	0.51	.0018740	49.0	22 17 40.21	
17	107	27 30 10.3	30 9.4	146.50	0.41	.0019910	48.6	22 13 44.30	
18	108	28 28 45.1	28 44.1	146.40	0.29	.0021072	48.3	22 9 48.39	
19	109	29 27 17.7	27 16.6	146.31	0.16	.0022227	48.0	22 5 52.49	
20	110	30 25 48.0	25 46.8	146.22	-0.02	.0023376	47.7	22 1 56.58	
21	111	31 24 16.2	24 14.9	146.13	+0.11	.0024519	47.5	21 58 0.67	
22	112	32 22 42.3	22 40.9	146.05	0.24	.0025657	47.3	21 54 4.76	
23	113	33 21 6.4	21 4.9	145.96	0.35	.0026791	47.1	21 50 8.86	
24	114	34 19 28.5	19 26.9	145.88	0.44	.0027921	47.0	21 46 12.95	
25	115	35 17 48.6	17 46.9	145.80	0.50	.0029049	46.8	21 42 17.04	
26	116	36 16 6.9	16 5.1	145.72	0.54	.0030173	46.7	21 38 21.13	
27	117	37 14 23.4	14 21.5	145.65	0.55	.0031293	46.6	21 34 25.22	
28	118	38 12 38.1	12 36.1	145.58	0.52	.0032410	46.4	21 30 29.31	
29	119	39 10 51.2	10 49.1	145.51	0.46	.0033522	46.2	21 26 33.40	
30	120	40 9 2.6	9 0.3	145.44	0.37	.0034629	46.0	21 22 37.49	
31	121	41 7 12.5	7 10.1	145.38	+ 0.25	0.0035730	45.7	21 18 41.58	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>h</sup> .830	

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.

Day of the Month	SEMI-DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
1	15' 43.5	15' 35.9	57' 36.1	-2.37	57' 8.0	-2.29	<sup>h</sup> 16 <sup>m</sup> 47.8	<sup>m</sup> 2.20	<sup>d</sup> 19.1
2	15 28.5	15 21.6	56 41.1	2.18	56 15.7	2.04	17 40.1	2.15	20.1
3	15 15.2	15 9.3	55 52.1	1.88	55 30.6	1.70	18 31.0	2.08	21.1
4	15 4.1	14 59.5	55 11.3	1.51	54 54.4	1.31	19 20.0	2.00	22.1
5	14 55.5	14 52.2	54 39.8	1.11	54 27.6	0.92	20 7.2	1.92	23.1
6	14 49.5	14 47.5	54 17.8	0.72	54 10.3	0.53	20 52.4	1.85	24.1
7	14 46.0	14 45.2	54 5.1	0.35	54 1.9	-0.18	21 36.2	1.80	25.1
8	14 44.9	14 45.1	54 0.8	-0.01	54 1.5	+0.13	22 18.9	1.77	26.1
9	14 45.8	14 46.8	54 4.0	+0.27	54 8.1	0.40	23 1.1	1.76	27.1
10	14 48.4	14 50.2	54 13.6	0.51	54 20.4	0.61	23 43.4	1.78	28.1
11	14 52.4	14 54.8	54 28.4	0.71	54 37.4	0.80	<sup>d</sup> 0 26.5		29.1
12	14 57.6	15 0.6	54 47.4	0.87	54 58.4	0.95	0 26.5	1.83	0.4
13	15 3.8	15 7.2	55 10.2	1.02	55 22.9	1.09	1 11.0	1.90	1.4
14	15 10.9	15 14.8	55 36.4	1.16	55 50.6	1.22	1 57.4	1.98	2.4
15	15 18.9	15 23.2	56 5.7	1.28	56 21.4	1.34	2 46.2	2.08	3.4
16	15 27.7	15 32.4	56 37.9	1.40	56 55.1	1.46	3 37.4	2.18	4.4
17	15 37.2	15 42.3	57 13.0	1.51	57 31.5	1.55	4 31.0	2.26	5.4
18	15 47.4	15 52.7	57 50.4	1.58	58 9.7	1.61	5 26.2	2.32	6.4
19	15 58.0	16 3.2	58 29.2	1.62	58 48.5	1.60	6 22.3	2.34	7.4
20	16 8.4	16 13.3	59 7.5	1.54	59 25.6	1.45	7 18.4	2.32	8.4
21	16 17.9	16 22.0	59 42.4	1.33	59 57.6	1.17	8 13.9	2.32	9.4
22	16 25.6	16 28.4	60 10.6	0.98	60 21.0	0.74	9 8.5	2.26	10.4
23	16 30.4	16 31.5	60 28.4	+0.47	60 32.4	+0.18	10 2.6	2.24	11.4
24	16 31.6	16 30.6	60 32.8	-0.13	60 29.2	-0.45	10 56.3	2.24	12.4
25	16 28.6	16 25.6	60 21.8	0.77	60 10.7	1.08	11 50.2	2.26	13.4
26	16 21.6	16 16.7	59 56.0	1.36	59 38.1	1.60	12 44.6	2.27	14.4
27	16 11.1	16 4.9	59 17.5	1.81	58 54.6	1.98	13 39.4	2.29	15.4
28	15 58.2	15 51.2	58 30.0	2.09	58 4.4	2.16	14 34.4	2.28	16.4
29	15 44.1	15 37.0	57 38.2	2.18	57 12.0	2.15	15 28.8	2.24	17.4
30	15 30.0	15 23.3	56 46.4	2.09	56 21.9	1.99	16 21.9	2.17	18.4
31	15 17.0	15 11.2	55 58.8	-1.86	55 37.4	-1.70	17 13.1	2.08	19.4

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 1.					SATURDAY 3.				
0	16 51 23.21	2.3131	S. 17 59 46.9	5.349	0	18 40 40.83	2.2284	S. 20 8 50.8	0.073
1	16 53 41.97	2.3121	18 5 4.5	5.238	1	18 42 54.46	2.2259	20 8 52.0	0.032
2	16 56 0.66	2.3110	18 10 15.5	5.128	2	18 45 7.94	2.2234	20 8 47.0	0.136
3	16 58 19.29	2.3099	18 15 19.8	5.017	3	18 47 21.27	2.2208	20 8 35.7	0.241
4	17 0 37.85	2.3088	18 20 17.5	4.906	4	18 49 34.45	2.2182	20 8 18.1	0.345
5	17 2 56.35	2.3077	18 25 8.5	4.795	5	18 51 47.47	2.2156	20 7 54.3	0.448
6	17 5 14.78	2.3066	18 29 52.8	4.684	6	18 54 0.33	2.2130	20 7 24.3	0.551
7	17 7 33.14	2.3054	18 34 30.5	4.572	7	18 56 13.03	2.2104	20 6 48.1	0.654
8	17 9 51.43	2.3041	18 39 1.5	4.461	8	18 58 25.58	2.2077	20 6 5.8	0.756
9	17 12 9.64	2.3029	18 43 25.8	4.350	9	19 0 37.96	2.2050	20 5 17.4	0.858
10	17 14 27.77	2.3016	18 47 43.5	4.238	10	19 2 50.18	2.2022	20 4 22.9	0.960
11	17 16 45.83	2.3003	18 51 54.5	4.126	11	19 5 2.24	2.1995	20 3 22.3	1.061
12	17 19 3.81	2.2989	18 55 58.7	4.015	12	19 7 14.13	2.1967	20 2 15.6	1.162
13	17 21 21.70	2.2975	18 59 56.3	3.903	13	19 9 25.85	2.1939	20 1 2.9	1.262
14	17 23 39.51	2.2961	19 3 47.1	3.791	14	19 11 37.40	2.1911	19 59 44.2	1.362
15	17 25 57.23	2.2946	19 7 31.2	3.680	15	19 13 48.78	2.1883	19 58 19.5	1.461
16	17 28 14.86	2.2931	19 11 8.7	3.568	16	19 16 0.00	2.1854	19 56 48.8	1.560
17	17 30 32.40	2.2916	19 14 39.4	3.456	17	19 18 11.04	2.1826	19 55 12.2	1.659
18	17 32 49.85	2.2901	19 18 3.4	3.345	18	19 20 21.91	2.1797	19 53 29.7	1.757
19	17 35 7.21	2.2885	19 21 20.8	3.233	19	19 22 32.61	2.1768	19 51 41.4	1.855
20	17 37 24.47	2.2869	19 24 31.5	3.122	20	19 24 43.13	2.1739	19 49 47.2	1.952
21	17 39 41.64	2.2852	19 27 35.5	3.011	21	19 26 53.48	2.1710	19 47 47.2	2.048
22	17 41 58.71	2.2835	19 30 32.8	2.900	22	19 29 3.66	2.1680	19 45 41.4	2.145
23	17 44 15.67	2.2818	S. 19 33 23.4	2.788	23	19 31 13.66	2.1651	S. 19 43 29.9	2.240
FRIDAY 2.					SUNDAY 4.				
0	17 46 32.53	2.2800	S. 19 36 7.4	2.677	0	19 33 23.48	2.1621	S. 19 41 12.6	2.335
1	17 48 49.28	2.2782	19 38 44.7	2.566	1	19 35 33.12	2.1591	19 38 49.6	2.430
2	17 51 5.92	2.2764	19 41 15.4	2.455	2	19 37 42.58	2.1561	19 36 21.0	2.525
3	17 53 22.45	2.2745	19 43 30.4	2.345	3	19 39 51.86	2.1531	19 33 46.7	2.618
4	17 55 38.87	2.2727	19 45 56.8	2.235	4	19 42 0.96	2.1501	19 31 6.8	2.712
5	17 57 55.18	2.2708	19 48 7.6	2.124	5	19 44 9.88	2.1470	19 28 21.3	2.804
6	18 0 11.37	2.2689	19 50 11.7	2.014	6	19 46 18.61	2.1440	19 25 30.3	2.897
7	18 2 27.44	2.2669	19 52 9.2	1.904	7	19 48 27.16	2.1410	19 22 33.7	2.988
8	18 4 43.39	2.2649	19 54 0.2	1.794	8	19 50 35.53	2.1379	19 19 31.7	3.080
9	18 6 59.22	2.2629	19 55 44.6	1.685	9	19 52 43.71	2.1348	19 16 24.2	3.170
10	18 9 14.93	2.2608	19 57 22.4	1.575	10	19 54 51.71	2.1318	19 13 11.2	3.261
11	18 11 30.51	2.2587	19 58 53.6	1.466	11	19 56 59.52	2.1287	19 9 52.8	3.351
12	18 13 45.97	2.2565	20 0 18.3	1.357	12	19 59 7.15	2.1256	19 6 29.1	3.440
13	18 16 1.30	2.2543	20 1 36.5	1.249	13	20 1 14.59	2.1224	19 3 0.1	3.528
14	18 18 16.49	2.2521	20 2 48.2	1.140	14	20 3 21.85	2.1193	18 59 25.7	3.616
15	18 20 31.55	2.2499	20 3 53.4	1.032	15	20 5 28.92	2.1162	18 55 46.1	3.704
16	18 22 46.48	2.2476	20 4 52.1	0.925	16	20 7 35.80	2.1131	18 52 1.2	3.791
17	18 25 1.27	2.2453	20 5 44.3	0.817	17	20 9 42.50	2.1100	18 48 11.1	3.878
18	18 27 15.92	2.2430	20 6 30.1	0.710	18	20 11 49.01	2.1069	18 44 15.8	3.965
19	18 29 30.43	2.2406	20 7 9.5	0.603	19	20 13 55.33	2.1038	18 40 15.4	4.050
20	18 31 44.80	2.2383	20 7 42.5	0.496	20	20 16 1.47	2.1007	18 36 9.9	4.134
21	18 33 59.03	2.2358	20 8 9.1	0.390	21	20 18 7.42	2.0976	18 31 59.3	4.219
22	18 36 13.11	2.2334	20 8 29.3	0.284	22	20 20 13.19	2.0945	18 27 43.6	4.303
23	18 38 27.04	2.2309	20 8 43.2	0.178	23	20 22 18.77	2.0913	18 23 22.9	4.386
24	18 40 40.83	2.2284	S. 20 8 50.8	0.073	24	20 24 24.16	2.0882	S. 18 18 57.3	4.468

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 5.					WEDNESDAY 7.				
0	20 24 24.16	2.0882	S. 18° 18' 57.3"	4.468	0	22 1 14.19	1.9527	S. 13° 19' 47.7"	7.778
1	20 26 29.36	2.0851	18 14 26.7	4.551	1	22 3 11.28	1.9504	13 11 59.3	7.833
2	20 28 34.38	2.0820	18 9 51.2	4.632	2	22 5 8.23	1.9481	13 4 7.7	7.888
3	20 30 39.21	2.0789	18 5 10.8	4.713	3	22 7 5.05	1.9458	12 56 12.8	7.942
4	20 32 43.85	2.0758	18 0 25.6	4.794	4	22 9 1.73	1.9435	12 48 14.7	7.995
5	20 34 48.31	2.0727	17 55 35.5	4.874	5	22 10 58.28	1.9413	12 40 13.4	8.048
6	20 36 52.58	2.0696	17 50 40.7	4.953	6	22 12 54.69	1.9391	12 32 9.0	8.100
7	20 38 56.67	2.0666	17 45 41.1	5.032	7	22 14 50.97	1.9368	12 24 1.5	8.151
8	20 41 0.57	2.0636	17 40 36.8	5.110	8	22 16 47.12	1.9348	12 15 50.9	8.202
9	20 43 4.29	2.0605	17 35 27.8	5.188	9	22 18 43.15	1.9327	12 7 37.3	8.253
10	20 45 7.83	2.0574	17 30 14.2	5.265	10	22 20 39.05	1.9306	11 59 20.6	8.302
11	20 47 11.19	2.0543	17 24 56.0	5.342	11	22 22 34.83	1.9286	11 51 0.9	8.352
12	20 49 14.36	2.0513	17 19 33.2	5.418	12	22 24 30.48	1.9266	11 42 38.3	8.400
13	20 51 17.35	2.0482	17 14 5.8	5.494	13	22 26 26.02	1.9246	11 34 12.8	8.449
14	20 53 20.16	2.0452	17 8 33.9	5.569	14	22 28 21.44	1.9227	11 25 44.4	8.496
15	20 55 22.78	2.0422	17 2 57.5	5.643	15	22 30 16.74	1.9208	11 17 13.2	8.543
16	20 57 25.22	2.0392	16 57 16.7	5.717	16	22 32 11.93	1.9189	11 8 30.3	8.590
17	20 59 27.49	2.0362	16 51 31.5	5.790	17	22 34 7.01	1.9170	11 0 2.5	8.635
18	21 1 29.58	2.0333	16 45 41.9	5.863	18	22 36 1.97	1.9152	10 51 23.0	8.681
19	21 3 31.49	2.0303	16 39 48.0	5.935	19	22 37 56.83	1.9134	10 42 40.8	8.726
20	21 5 33.22	2.0274	16 33 49.7	6.007	20	22 39 51.58	1.9117	10 33 55.9	8.770
21	21 7 34.78	2.0244	16 27 47.2	6.077	21	22 41 46.23	1.9100	10 25 8.4	8.813
22	21 9 36.16	2.0215	16 21 40.4	6.148	22	22 43 40.77	1.9083	10 16 18.3	8.856
23	21 11 37.37	2.0186	S. 16° 15' 29.4"	6.218	23	22 45 35.22	1.9066	S. 10° 7' 25.7"	8.898
TUESDAY 6.					THURSDAY 8.				
0	21 13 38.40	2.0158	S. 16° 9' 14.2"	6.287	0	22 47 29.56	1.9050	S. 9° 58' 30.6"	8.940
1	21 15 39.26	2.0128	16 2 55.0	6.356	1	22 49 23.81	1.9034	9 49 32.9	8.982
2	21 17 39.95	2.0101	15 56 31.6	6.424	2	22 51 17.97	1.9019	9 40 32.8	9.022
3	21 19 40.47	2.0072	15 50 4.1	6.491	3	22 53 12.04	1.9003	9 31 30.2	9.062
4	21 21 40.82	2.0044	15 43 32.6	6.558	4	22 55 6.01	1.8988	9 22 25.3	9.102
5	21 23 41.00	2.0016	15 36 57.1	6.625	5	22 56 59.90	1.8974	9 13 18.0	9.141
6	21 25 41.02	1.9989	15 30 17.6	6.691	6	22 58 53.70	1.8960	9 4 8.4	9.179
7	21 27 40.87	1.9961	15 23 34.2	6.756	7	23 0 47.42	1.8946	8 54 56.5	9.217
8	21 29 40.56	1.9934	15 16 46.9	6.821	8	23 2 41.06	1.8933	8 45 42.4	9.254
9	21 31 40.08	1.9907	15 9 55.7	6.885	9	23 4 34.62	1.8920	8 36 26.0	9.291
10	21 33 39.44	1.9880	15 3 0.7	6.948	10	23 6 28.10	1.8907	8 27 7.5	9.327
11	21 35 38.64	1.9853	14 56 1.9	7.011	11	23 8 21.51	1.8895	8 17 46.8	9.362
12	21 37 37.68	1.9827	14 48 59.4	7.074	12	23 10 14.84	1.8883	8 8 24.0	9.397
13	21 39 36.56	1.9800	14 41 53.1	7.136	13	23 12 8.11	1.8871	7 58 59.1	9.431
14	21 41 35.28	1.9774	14 34 43.1	7.197	14	23 14 1.30	1.8860	7 49 32.2	9.465
15	21 43 33.85	1.9748	14 27 29.5	7.258	15	23 15 54.43	1.8850	7 40 3.3	9.498
16	21 45 32.26	1.9723	14 20 12.2	7.318	16	23 17 47.50	1.8839	7 30 32.4	9.531
17	21 47 30.52	1.9697	14 12 51.3	7.377	17	23 19 40.51	1.8829	7 20 59.6	9.563
18	21 49 28.63	1.9672	14 5 26.9	7.436	18	23 21 33.45	1.8819	7 11 24.9	9.594
19	21 51 26.59	1.9647	13 57 59.0	7.495	19	23 23 26.34	1.8810	7 1 48.3	9.625
20	21 53 24.40	1.9623	13 50 27.6	7.552	20	23 25 19.18	1.8801	6 52 9.9	9.655
21	21 55 22.06	1.9598	13 42 52.7	7.610	21	23 27 11.96	1.8793	6 42 29.7	9.685
22	21 57 19.58	1.9574	13 35 14.4	7.667	22	23 29 4.69	1.8785	6 32 47.7	9.714
23	21 59 16.96	1.9550	13 27 32.7	7.723	23	23 30 57.37	1.8777	6 23 4.0	9.742
24	22 1 14.19	1.9527	S. 13° 19' 47.7"	7.778	24	23 32 50.01	1.8770	S. 6° 13' 18.7"	9.770

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 9.					SUNDAY 11.				
0	<sup>h</sup> 23 <sup>m</sup> 32 <sup>s</sup> 50.01	1.8770	S. 6° 13' 18.7"	9.770	0	<sup>h</sup> 1 <sup>m</sup> 2 <sup>s</sup> 50.34	1.8890	N. 1° 56' 9.8"	10.382
1	23 34 42.61	1.8763	6 3 31.7	9.797	1	1 4 43.72	1.8902	2 6 32.7	10.379
2	23 36 35.16	1.8756	5 53 43.1	9.824	2	1 6 37.17	1.8915	2 16 55.3	10.375
3	23 38 27.68	1.8750	5 43 52.9	9.850	3	1 8 30.70	1.8928	2 27 17.7	10.371
4	23 40 20.16	1.8744	5 34 1.1	9.875	4	1 10 24.31	1.8942	2 37 39.8	10.366
5	23 42 12.61	1.8739	5 24 7.8	9.900	5	1 12 18.01	1.8956	2 48 1.6	10.360
6	23 44 5.03	1.8734	5 14 13.1	9.924	6	1 14 11.79	1.8971	2 58 23.0	10.353
7	23 45 57.42	1.8729	5 4 16.9	9.948	7	1 16 5.66	1.8986	3 8 44.0	10.346
8	23 47 49.78	1.8725	4 54 19.3	9.971	8	1 17 59.62	1.9001	3 19 4.5	10.338
9	23 49 42.12	1.8721	4 44 20.4	9.994	9	1 19 53.67	1.9017	3 29 24.5	10.329
10	23 51 34.43	1.8717	4 34 20.1	10.015	10	1 21 47.82	1.9033	3 39 44.0	10.320
11	23 53 26.72	1.8714	4 24 18.5	10.037	11	1 23 42.06	1.9050	3 50 2.9	10.310
12	23 55 19.00	1.8712	4 14 15.6	10.057	12	1 25 36.41	1.9067	4 0 21.2	10.299
13	23 57 11.27	1.8710	4 4 11.6	10.077	13	1 27 30.87	1.9085	4 10 38.8	10.288
14	23 59 3.52	1.8708	3 54 6.4	10.096	14	1 29 25.43	1.9103	4 20 55.7	10.276
15	0 0 55.76	1.8706	3 44 0.0	10.115	15	1 31 20.10	1.9121	4 31 11.9	10.263
16	0 2 47.99	1.8705	3 33 52.5	10.134	16	1 33 14.88	1.9140	4 41 27.3	10.249
17	0 4 40.22	1.8705	3 23 43.9	10.152	17	1 35 9.77	1.9159	4 51 41.8	10.235
18	0 6 32.45	1.8705	3 13 34.3	10.169	18	1 37 4.78	1.9178	5 1 55.4	10.220
19	0 8 24.68	1.8705	3 3 23.7	10.185	19	1 38 59.91	1.9198	5 12 8.1	10.204
20	0 10 16.91	1.8706	2 53 12.1	10.201	20	1 40 55.16	1.9218	5 22 19.9	10.187
21	0 12 9.14	1.8707	2 42 59.5	10.216	21	1 42 50.53	1.9239	5 32 30.6	10.170
22	0 14 1.38	1.8708	2 32 46.1	10.231	22	1 44 46.02	1.9259	5 42 40.3	10.152
23	0 15 53.63	1.8710	S. 2° 22' 31.8"	10.245	23	1 46 41.64	1.9281	N. 5° 52' 48.8"	10.133
SATURDAY 10.					MONDAY 12.				
0	0 17 45.90	1.8712	S. 2° 12' 16.7"	10.258	0	1 48 37.39	1.9303	N. 6° 2' 56.2"	10.113
1	0 19 38.18	1.8715	2 2 0.8	10.270	1	1 50 33.27	1.9325	6 13 2.4	10.093
2	0 21 30.48	1.8718	1 51 44.2	10.282	2	1 52 29.29	1.9347	6 23 7.4	10.072
3	0 23 22.80	1.8721	1 41 26.9	10.294	3	1 54 25.44	1.9370	6 33 11.1	10.050
4	0 25 15.14	1.8725	1 31 9.0	10.305	4	1 56 21.73	1.9394	6 43 13.5	10.028
5	0 27 7.50	1.8730	1 20 50.4	10.315	5	1 58 18.16	1.9417	6 53 14.5	10.005
6	0 28 59.89	1.8734	1 10 31.2	10.324	6	2 0 14.74	1.9441	7 3 14.0	9.980
7	0 30 52.31	1.8739	1 0 11.5	10.333	7	2 2 11.46	1.9466	7 13 12.1	9.956
8	0 32 44.76	1.8744	0 49 51.3	10.341	8	2 4 8.33	1.9491	7 23 8.7	9.930
9	0 34 37.24	1.8750	0 39 30.6	10.349	9	2 6 5.35	1.9516	7 33 3.7	9.904
10	0 36 29.76	1.8757	0 29 9.5	10.356	10	2 8 2.52	1.9541	7 42 57.1	9.877
11	0 38 22.32	1.8764	0 18 47.9	10.362	11	2 9 59.85	1.9567	7 52 48.8	9.849
12	0 40 14.92	1.8771	S. 0° 8' 26.0"	10.367	12	2 11 57.33	1.9594	8 2 38.9	9.820
13	0 42 7.57	1.8779	N. 0° 1' 56.2"	10.372	13	2 13 54.97	1.9620	8 12 27.2	9.790
14	0 44 0.27	1.8787	0 12 18.7	10.377	14	2 15 52.77	1.9647	8 22 13.7	9.760
15	0 45 53.01	1.8795	0 22 41.4	10.380	15	2 17 50.73	1.9675	8 31 58.4	9.729
16	0 47 45.81	1.8804	0 33 4.3	10.383	16	2 19 48.86	1.9703	8 41 41.2	9.697
17	0 49 38.66	1.8813	0 43 27.4	10.385	17	2 21 47.16	1.9730	8 51 22.1	9.665
18	0 51 31.57	1.8823	0 53 50.6	10.387	18	2 23 45.63	1.9758	9 1 1.0	9.631
19	0 53 24.54	1.8833	1 4 13.9	10.388	19	2 25 44.27	1.9787	9 10 37.9	9.597
20	0 55 17.57	1.8843	1 14 37.2	10.388	20	2 27 43.08	1.9816	9 20 12.7	9.562
21	0 57 10.66	1.8854	1 25 0.5	10.388	21	2 29 42.06	1.9845	9 29 45.3	9.526
22	0 59 3.82	1.8865	1 35 23.7	10.387	22	2 31 41.22	1.9875	9 39 15.8	9.490
23	1 0 57.04	1.8877	1 45 46.8	10.385	23	2 33 40.56	1.9905	9 48 44.1	9.452
24	1 2 50.34	1.8890	N. 1° 56' 9.8"	10.382	24	2 35 40.08	1.9935	N. 9° 58' 10.1"	9.414



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 13.					THURSDAY 15.				
0	2 <sup>h</sup> 35 <sup>m</sup> 40.08 <sup>s</sup>	1.9935	N. 9° 58' 10.1"	9.414	0	4 <sup>h</sup> 15 <sup>m</sup> 21.17 <sup>s</sup>	2.1673	N. 16° 30' 18.8"	6.601
1	2 37 39.79	1.9966	10 7 33.8	9.375	1	4 17 31.32	2.1712	16 36 52.5	6.521
2	2 39 39.68	1.9997	10 16 55.1	9.335	2	4 19 41.71	2.1752	16 43 21.4	6.441
3	2 41 39.76	2.0029	10 26 14.0	9.295	3	4 21 52.34	2.1791	16 49 45.4	6.360
4	2 43 40.03	2.0061	10 35 30.5	9.253	4	4 24 3.20	2.1830	16 56 4.6	6.278
5	2 45 40.49	2.0093	10 44 44.4	9.211	5	4 26 14.30	2.1870	17 2 18.8	6.196
6	2 47 41.14	2.0125	10 53 55.8	9.168	6	4 28 25.64	2.1909	17 8 28.1	6.112
7	2 49 41.99	2.0157	11 3 4.6	9.124	7	4 30 37.21	2.1948	17 14 32.3	6.028
8	2 51 43.03	2.0190	11 12 10.7	9.080	8	4 32 49.02	2.1987	17 20 31.5	5.943
9	2 53 44.27	2.0223	11 21 14.1	9.034	9	4 35 1.06	2.2027	17 26 25.5	5.857
10	2 55 45.70	2.0256	11 30 14.8	8.988	10	4 37 13.34	2.2066	17 32 14.3	5.770
11	2 57 47.34	2.0290	11 39 12.7	8.941	11	4 39 25.85	2.2105	17 37 57.9	5.683
12	2 59 49.17	2.0324	11 48 7.7	8.892	12	4 41 38.60	2.2143	17 43 36.2	5.594
13	3 1 51.22	2.0358	11 56 59.8	8.844	13	4 43 51.58	2.2182	17 49 9.2	5.505
14	3 3 53.47	2.0392	12 5 48.9	8.794	14	4 46 4.79	2.2221	17 54 36.8	5.415
15	3 5 55.93	2.0427	12 14 35.0	8.743	15	4 48 18.23	2.2259	17 59 59.0	5.324
16	3 7 58.60	2.0462	12 23 18.1	8.692	16	4 50 31.90	2.2298	18 5 15.7	5.233
17	3 10 1.47	2.0497	12 31 58.1	8.640	17	4 52 45.80	2.2336	18 10 26.9	5.140
18	3 12 4.56	2.0532	12 40 34.9	8.587	18	4 54 59.93	2.2374	18 15 32.5	5.047
19	3 14 7.86	2.0568	12 49 8.5	8.533	19	4 57 14.29	2.2412	18 20 32.6	4.954
20	3 16 11.37	2.0604	12 57 38.9	8.478	20	4 59 28.87	2.2450	18 25 27.0	4.859
21	3 18 15.10	2.0640	13 6 5.9	8.423	21	5 1 43.68	2.2487	18 30 15.7	4.764
22	3 20 19.05	2.0676	13 14 29.6	8.366	22	5 3 58.72	2.2524	18 34 58.6	4.667
23	3 22 23.21	2.0712	N. 13° 22' 49.9"	8.309	23	5 6 13.98	2.2562	N. 18° 39' 35.7"	4.570
WEDNESDAY 14.					FRIDAY 16.				
0	3 24 27.59	2.0749	N. 13° 31' 6.7"	8.251	0	5 8 29.46	2.2599	N. 18° 44' 7.0"	4.472
1	3 26 32.20	2.0786	13 39 20.0	8.192	1	5 10 45.16	2.2635	18 48 32.4	4.374
2	3 28 37.03	2.0823	13 47 29.7	8.133	2	5 13 1.08	2.2672	18 52 51.9	4.275
3	3 30 42.08	2.0860	13 55 35.8	8.071	3	5 15 17.22	2.2708	18 57 5.4	4.175
4	3 32 47.35	2.0898	14 3 38.3	8.010	4	5 17 33.58	2.2744	19 1 12.9	4.075
5	3 34 52.85	2.0936	14 11 37.0	7.948	5	5 19 50.15	2.2780	19 5 14.3	3.973
6	3 36 58.58	2.0973	14 19 32.0	7.885	6	5 22 6.93	2.2815	19 9 9.7	3.871
7	3 39 4.53	2.1011	14 27 23.2	7.820	7	5 24 23.93	2.2850	19 12 58.9	3.769
8	3 41 10.71	2.1049	14 35 10.5	7.755	8	5 26 41.14	2.2885	19 16 41.9	3.665
9	3 43 17.12	2.1087	14 42 53.8	7.689	9	5 28 58.55	2.2920	19 20 18.8	3.561
10	3 45 23.75	2.1125	14 50 33.2	7.623	10	5 31 16.17	2.2954	19 23 49.4	3.457
11	3 47 30.62	2.1164	14 58 8.5	7.555	11	5 33 34.00	2.2988	19 27 13.6	3.351
12	3 49 37.72	2.1203	15 5 39.8	7.487	12	5 35 52.03	2.3021	19 30 31.5	3.245
13	3 51 45.05	2.1241	15 13 6.9	7.417	13	5 38 10.26	2.3055	19 33 43.0	3.138
14	3 53 52.62	2.1280	15 20 29.9	7.347	14	5 40 28.69	2.3088	19 36 48.1	3.031
15	3 56 0.42	2.1319	15 27 48.6	7.277	15	5 42 47.31	2.3120	19 39 46.7	2.923
16	3 58 8.45	2.1358	15 35 3.1	7.205	16	5 45 6.13	2.3153	19 42 38.8	2.814
17	4 0 16.72	2.1397	15 42 13.2	7.132	17	5 47 25.14	2.3185	19 45 24.4	2.705
18	4 2 25.22	2.1436	15 49 19.0	7.059	18	5 49 44.34	2.3216	19 48 3.4	2.595
19	4 4 33.96	2.1476	15 56 20.3	6.985	19	5 52 3.73	2.3247	19 50 35.8	2.485
20	4 6 42.93	2.1515	16 3 17.2	6.910	20	5 54 23.30	2.3277	19 53 1.6	2.374
21	4 8 52.14	2.1554	16 10 9.5	6.834	21	5 56 43.06	2.3308	19 55 20.7	2.263
22	4 11 1.58	2.1594	16 16 57.3	6.757	22	5 59 3.00	2.3338	19 57 33.1	2.150
23	4 13 11.26	2.1633	16 23 40.4	6.679	23	6 1 23.12	2.3367	19 59 38.7	2.037
24	4 15 21.17	2.1673	N. 16° 30' 18.8"	6.601	24	6 3 43.41	2.3396	N. 20° 1' 37.5"	1.924

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 17.					MONDAY 19.				
0	6 3 43.41	2.3396	N.20° 1' 37.5"	1.994	0	7 58 24.02	2.4176	N.19° 16' 24.6"	3.884
1	6 6 3.87	2.3425	20 3 29.6	1.810	1	8 0 49.09	2.4179	19 12 27.9	4.007
2	6 8 24.50	2.3453	20 5 14.8	1.696	2	8 3 14.17	2.4181	19 8 23.8	4.139
3	6 10 45.30	2.3481	20 6 53.1	1.581	3	8 5 39.27	2.4183	19 4 12.4	4.251
4	6 13 6.27	2.3508	20 8 24.5	1.466	4	8 8 4.37	2.4184	18 59 53.7	4.373
5	6 15 27.40	2.3534	20 9 49.0	1.350	5	8 10 29.48	2.4185	18 55 27.6	4.495
6	6 17 48.69	2.3561	20 11 6.5	1.234	6	8 12 54.59	2.4186	18 50 54.3	4.616
7	6 20 10.13	2.3586	20 12 17.1	1.118	7	8 15 19.71	2.4186	18 46 13.7	4.737
8	6 22 31.72	2.3611	20 13 20.7	1.001	8	8 17 44.82	2.4185	18 41 25.8	4.858
9	6 24 53.47	2.3636	20 14 17.2	0.883	9	8 20 9.93	2.4184	18 36 30.7	4.978
10	6 27 15.36	2.3660	20 15 6.6	0.765	10	8 22 35.03	2.4183	18 31 28.4	5.098
11	6 29 37.39	2.3684	20 15 49.0	0.647	11	8 25 0.11	2.4180	18 26 18.9	5.218
12	6 31 59.57	2.3707	20 16 24.2	0.528	12	8 27 25.18	2.4177	18 21 2.2	5.337
13	6 34 21.88	2.3730	20 16 52.3	0.409	13	8 29 50.23	2.4174	18 15 38.3	5.457
14	6 36 44.33	2.3752	20 17 13.2	0.289	14	8 32 15.27	2.4171	18 10 7.3	5.576
15	6 39 6.91	2.3774	20 17 27.0	0.169	15	8 34 40.28	2.4167	18 4 29.2	5.694
16	6 41 29.62	2.3795	20 17 33.6	0.049	16	8 37 5.27	2.4163	17 58 44.0	5.812
17	6 43 52.45	2.3815	20 17 32.9	0.072	17	8 39 30.23	2.4158	17 52 51.8	5.929
18	6 46 15.40	2.3835	20 17 25.0	0.192	18	8 41 55.16	2.4153	17 46 52.5	6.046
19	6 48 38.47	2.3855	20 17 9.8	0.313	19	8 44 20.06	2.4147	17 40 46.2	6.162
20	6 51 1.66	2.3874	20 16 47.4	0.434	20	8 46 44.93	2.4142	17 34 33.0	6.278
21	6 53 24.96	2.3892	20 16 17.7	0.556	21	8 49 9.76	2.4135	17 28 12.8	6.394
22	6 55 48.37	2.3910	20 15 40.7	0.678	22	8 51 34.56	2.4129	17 21 45.8	6.509
23	6 58 11.88	2.3927	N.20 14 56.3	0.800	23	8 53 59.32	2.4122	N.17 15 11.9	6.623
SUNDAY 18.					TUESDAY 20.				
0	7 0 35.49	2.3944	N.20 14 4.6	0.923	0	8 56 24.03	2.4114	N.17 8 31.1	6.736
1	7 2 59.21	2.3960	20 13 5.6	1.045	1	8 58 48.09	2.4107	17 1 43.5	6.849
2	7 5 23.02	2.3976	20 11 59.2	1.168	2	9 1 13.31	2.4099	16 54 49.2	6.962
3	7 7 46.92	2.3991	20 10 45.4	1.291	3	9 3 37.88	2.4091	16 47 48.1	7.074
4	7 10 10.91	2.4005	20 9 24.2	1.414	4	9 6 2.40	2.4083	16 40 40.3	7.185
5	7 12 34.98	2.4019	20 7 55.6	1.537	5	9 8 26.86	2.4073	16 33 25.9	7.295
6	7 14 59.14	2.4032	20 6 19.7	1.661	6	9 10 51.27	2.4064	16 26 4.9	7.405
7	7 17 23.37	2.4045	20 4 36.4	1.784	7	9 13 15.62	2.4054	16 18 37.3	7.514
8	7 19 47.68	2.4057	20 2 45.7	1.908	8	9 15 39.92	2.4044	16 11 3.2	7.622
9	7 22 12.06	2.4069	20 0 47.5	2.031	9	9 18 4.16	2.4034	16 3 22.6	7.730
10	7 24 36.51	2.4080	19 58 41.9	2.155	10	9 20 28.34	2.4024	15 55 35.6	7.837
11	7 27 1.02	2.4090	19 56 28.9	2.279	11	9 22 52.45	2.4013	15 47 42.2	7.943
12	7 29 25.59	2.4100	19 54 8.4	2.403	12	9 25 16.50	2.4003	15 39 42.4	8.049
13	7 31 50.22	2.4110	19 51 40.5	2.526	13	9 27 40.48	2.3992	15 31 36.3	8.154
14	7 34 14.90	2.4118	19 49 5.2	2.650	14	9 30 4.40	2.3980	15 23 24.0	8.258
15	7 36 39.64	2.4127	19 46 22.5	2.774	15	9 32 28.25	2.3969	15 15 5.4	8.361
16	7 39 4.42	2.4134	19 43 32.4	2.897	16	9 34 52.03	2.3958	15 6 40.7	8.463
17	7 41 29.25	2.4141	19 40 34.8	3.021	17	9 37 15.74	2.3946	14 58 9.9	8.564
18	7 43 54.12	2.4148	19 37 29.8	3.145	18	9 39 39.38	2.3934	14 49 33.0	8.665
19	7 46 19.03	2.4154	19 34 17.4	3.268	19	9 42 2.95	2.3922	14 40 50.1	8.765
20	7 48 43.97	2.4160	19 30 57.6	3.391	20	9 44 26.45	2.3910	14 32 1.3	8.863
21	7 51 8.94	2.4165	19 27 30.5	3.515	21	9 46 49.87	2.3897	14 23 6.5	8.961
22	7 53 33.94	2.4169	19 23 55.9	3.638	22	9 49 13.22	2.3885	14 14 5.9	9.058
23	7 55 58.97	2.4173	19 20 13.9	3.761	23	9 51 36.49	2.3872	14 4 59.5	9.154
24	7 58 24.02	2.4176	N.19 16 24.6	3.884	24	9 53 59.63	2.3860	N.13 55 47.3	9.250

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 21.					FRIDAY 23.				
0	9 53 59.69	2.3860	N. 13° 55' 47.3"	9.250	0	11 47 5.62	2.3310	N. 5° 3' 4.0"	12.473
1	9 56 22.81	2.3847	13 46 29.5	9.344	1	11 49 25.46	2.3303	4 50 34.6	12.508
2	9 58 45.86	2.3834	13 37 6.1	9.437	2	11 51 45.26	2.3296	4 38 3.1	12.541
3	10 1 8.83	2.3821	13 27 37.1	9.529	3	11 54 5.01	2.3289	4 25 29.6	12.574
4	10 3 31.72	2.3809	13 18 2.6	9.620	4	11 56 24.73	2.3283	4 12 54.2	12.604
5	10 5 54.53	2.3796	13 8 22.6	9.711	5	11 58 44.41	2.3277	4 0 17.1	12.633
6	10 8 17.26	2.3782	12 58 37.3	9.800	6	12 1 4.06	2.3271	3 47 38.3	12.661
7	10 10 39.92	2.3769	12 48 46.6	9.888	7	12 3 23.67	2.3266	3 34 57.9	12.687
8	10 13 2.49	2.3756	12 38 50.7	9.975	8	12 5 43.25	2.3261	3 22 15.9	12.711
9	10 15 24.99	2.3743	12 28 49.6	10.061	9	12 8 2.80	2.3256	3 9 32.5	12.735
10	10 17 47.41	2.3730	12 18 43.3	10.146	10	12 10 22.32	2.3251	2 56 47.8	12.757
11	10 20 9.75	2.3716	12 8 32.0	10.230	11	12 12 41.82	2.3247	2 44 1.8	12.777
12	10 22 32.01	2.3703	11 58 15.7	10.313	12	12 15 1.29	2.3243	2 31 14.6	12.795
13	10 24 54.19	2.3690	11 47 54.4	10.395	13	12 17 20.74	2.3239	2 18 26.4	12.812
14	10 27 16.29	2.3677	11 37 28.3	10.475	14	12 19 40.16	2.3236	2 5 37.1	12.828
15	10 29 38.32	2.3664	11 26 57.4	10.555	15	12 21 59.57	2.3232	1 52 47.0	12.842
16	10 32 0.26	2.3651	11 16 21.7	10.633	16	12 24 18.96	2.3230	1 39 56.0	12.855
17	10 34 22.13	2.3638	11 5 41.4	10.710	17	12 26 38.33	2.3227	1 27 4.3	12.866
18	10 36 43.92	2.3625	10 54 56.5	10.786	18	12 28 57.69	2.3225	1 14 12.0	12.876
19	10 39 5.63	2.3613	10 44 7.1	10.861	19	12 31 17.03	2.3223	1 1 19.2	12.884
20	10 41 27.27	2.3600	10 33 13.2	10.935	20	12 33 36.36	2.3221	0 48 25.9	12.891
21	10 43 48.83	2.3588	10 22 15.0	11.007	21	12 35 55.68	2.3220	0 35 32.3	12.896
22	10 46 10.32	2.3575	10 11 12.4	11.078	22	12 38 15.00	2.3219	0 22 38.4	12.900
23	10 48 31.74	2.3563	N. 10° 0' 5.6"	11.148	23	12 40 34.31	2.3218	N. 0° 9' 44.3"	12.902
THURSDAY 22.					SATURDAY 24.				
0	10 50 53.08	2.3551	N. 9° 48' 54.6"	11.217	0	12 42 53.62	2.3217	S. 0° 3' 9.8"	12.902
1	10 53 14.35	2.3538	9 37 39.6	11.284	1	12 45 12.92	2.3217	0 16 3.9	12.901
2	10 55 35.54	2.3526	9 26 20.5	11.351	2	12 47 32.23	2.3218	0 28 57.9	12.899
3	10 57 56.66	2.3514	9 14 57.5	11.416	3	12 49 51.53	2.3219	0 41 51.7	12.895
4	11 0 17.71	2.3502	9 3 30.6	11.480	4	12 52 10.84	2.3219	0 54 45.3	12.889
5	11 2 38.69	2.3491	8 51 59.9	11.542	5	12 54 30.15	2.3220	1 7 38.5	12.882
6	11 4 59.60	2.3480	8 40 25.5	11.603	6	12 56 49.47	2.3221	1 20 31.2	12.874
7	11 7 20.45	2.3468	8 28 47.5	11.663	7	12 59 8.79	2.3222	1 33 23.3	12.864
8	11 9 41.23	2.3458	8 17 5.9	11.722	8	13 1 28.13	2.3223	1 46 14.8	12.852
9	11 12 1.94	2.3447	8 5 20.9	11.779	9	13 3 47.48	2.3225	1 59 5.5	12.839
10	11 14 22.59	2.3436	7 53 32.5	11.835	10	13 6 6.84	2.3228	2 11 55.4	12.824
11	11 16 43.18	2.3426	7 41 40.8	11.889	11	13 8 26.21	2.3230	2 24 44.4	12.808
12	11 19 3.70	2.3415	7 29 45.8	11.942	12	13 10 45.60	2.3234	2 37 32.4	12.790
13	11 21 24.16	2.3405	7 17 47.7	11.994	13	13 13 5.01	2.3237	2 50 19.2	12.770
14	11 23 44.56	2.3395	7 5 46.5	12.045	14	13 15 24.44	2.3240	3 3 4.8	12.750
15	11 26 4.90	2.3386	6 53 42.3	12.094	15	13 17 43.89	2.3244	3 15 49.2	12.728
16	11 28 25.19	2.3376	6 41 35.2	12.142	16	13 20 3.36	2.3247	3 28 32.2	12.704
17	11 30 45.42	2.3367	6 29 25.3	12.188	17	13 22 22.86	2.3251	3 41 13.7	12.679
18	11 33 5.60	2.3358	6 17 12.6	12.233	18	13 24 42.38	2.3256	3 53 53.7	12.652
19	11 35 25.73	2.3350	6 4 57.3	12.276	19	13 27 1.93	2.3260	4 6 32.0	12.624
20	11 37 45.80	2.3341	5 52 39.4	12.318	20	13 29 21.51	2.3265	4 19 8.6	12.595
21	11 40 5.82	2.3333	5 40 19.1	12.359	21	13 31 41.11	2.3270	4 31 43.4	12.564
22	11 42 25.80	2.3325	5 27 56.3	12.398	22	13 34 0.75	2.3275	4 44 16.3	12.531
23	11 44 45.74	2.3317	5 15 31.3	12.436	23	13 36 20.41	2.3281	4 56 47.1	12.496
24	11 47 5.62	2.3310	N. 5° 3' 4.0"	12.473	24	13 38 40.11	2.3286	S. 5° 9' 15.8"	12.460

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 25.					TUESDAY 27.				
0	<sup>h</sup> 13 <sup>m</sup> 38 <sup>s</sup> 40.11	2.3286	S. 5° 9' 15.8"	12.460	0	<sup>h</sup> 15 <sup>m</sup> 31 <sup>s</sup> 19.20	2.3657	S. 14° 0' 19.3"	2.190
1	13 40 59.84	2.3292	5 21 42.3	12.423	1	15 33 41.16	2.3663	14 9 27.8	9.094
2	13 43 19.61	2.3298	5 34 6.6	12.385	2	15 36 3.16	2.3669	14 18 30.6	8.937
3	13 45 39.42	2.3305	5 46 28.5	12.345	3	15 38 25.19	2.3675	14 27 27.5	8.900
4	13 47 59.27	2.3311	5 58 48.0	12.304	4	15 40 47.26	2.3680	14 36 18.5	8.861
5	13 50 19.16	2.3317	6 11 5.0	12.261	5	15 43 9.36	2.3686	14 45 3.6	8.792
6	13 52 39.08	2.3324	6 23 19.4	12.217	6	15 45 31.49	2.3690	14 53 42.8	8.698
7	13 54 59.04	2.3331	6 35 31.0	12.171	7	15 47 53.65	2.3695	15 2 15.9	8.501
8	13 57 19.05	2.3338	6 47 39.9	12.124	8	15 50 15.83	2.3699	15 10 42.9	8.400
9	13 59 39.10	2.3345	6 59 45.9	12.075	9	15 52 38.04	2.3703	15 19 3.8	8.297
10	14 1 59.19	2.3353	7 11 48.9	12.025	10	15 55 0.27	2.3707	15 27 18.6	8.194
11	14 4 19.33	2.3360	7 23 48.9	11.973	11	15 57 22.52	2.3711	15 35 27.1	8.090
12	14 6 39.52	2.3368	7 35 45.7	11.921	12	15 59 44.80	2.3714	15 43 29.4	7.985
13	14 8 59.75	2.3376	7 47 39.4	11.867	13	16 2 7.09	2.3717	15 51 25.4	7.880
14	14 11 20.03	2.3384	7 59 29.7	11.811	14	16 4 29.40	2.3719	15 59 15.0	7.774
15	14 13 40.36	2.3392	8 11 16.7	11.754	15	16 6 51.72	2.3722	16 6 58.2	7.667
16	14 16 0.74	2.3400	8 23 0.2	11.696	16	16 9 14.06	2.3724	16 14 35.0	7.560
17	14 18 21.17	2.3408	8 34 40.2	11.636	17	16 11 36.41	2.3725	16 22 5.3	7.452
18	14 20 41.63	2.3417	8 46 16.6	11.576	18	16 13 58.76	2.3726	16 29 29.2	7.344
19	14 23 2.16	2.3425	8 57 49.3	11.514	19	16 16 21.12	2.3727	16 36 46.6	7.235
20	14 25 22.73	2.3433	9 9 18.2	11.450	20	16 18 43.48	2.3727	16 43 57.3	7.125
21	14 27 43.37	2.3442	9 20 43.3	11.385	21	16 21 5.84	2.3727	16 51 1.5	7.014
22	14 30 4.05	2.3450	9 32 4.5	11.319	22	16 23 28.20	2.3727	16 57 59.0	6.903
23	14 32 24.77	2.3459	S. 9 43 21.6	11.252	23	16 25 50.56	2.3726	S. 17 4 49.9	6.792
MONDAY 26.					WEDNESDAY 28.				
0	14 34 45.55	2.3467	S. 9 54 34.6	11.183	0	16 28 12.92	2.3725	S. 17 11 34.0	6.680
1	14 37 6.38	2.3476	10 5 43.6	11.114	1	16 30 35.26	2.3723	17 18 11.4	6.568
2	14 39 27.26	2.3485	10 16 48.3	11.043	2	16 32 57.59	2.3721	17 24 42.1	6.455
3	14 41 48.19	2.3493	10 27 48.7	10.971	3	16 35 19.91	2.3718	17 31 6.0	6.342
4	14 44 9.18	2.3502	10 38 44.7	10.896	4	16 37 42.21	2.3715	17 37 23.1	6.228
5	14 46 30.22	2.3511	10 49 36.3	10.821	5	16 40 4.49	2.3712	17 43 33.4	6.114
6	14 48 51.31	2.3519	11 0 23.3	10.745	6	16 42 26.75	2.3708	17 49 36.8	6.000
7	14 51 12.45	2.3527	11 11 5.7	10.668	7	16 44 48.99	2.3704	17 55 33.4	5.885
8	14 53 33.64	2.3536	11 21 43.5	10.590	8	16 47 11.20	2.3699	18 1 23.1	5.770
9	14 55 54.88	2.3544	11 32 16.5	10.510	9	16 49 33.38	2.3694	18 7 5.9	5.655
10	14 58 16.17	2.3553	11 42 44.7	10.430	10	16 51 55.53	2.3688	18 12 41.7	5.539
11	15 0 37.52	2.3561	11 53 8.0	10.348	11	16 54 17.64	2.3682	18 18 10.6	5.423
12	15 2 58.91	2.3569	12 3 26.4	10.265	12	16 56 39.71	2.3675	18 23 32.5	5.307
13	15 5 20.35	2.3577	12 13 39.8	10.182	13	16 59 1.74	2.3668	18 28 47.4	5.190
14	15 7 41.84	2.3585	12 23 48.2	10.097	14	17 1 23.72	2.3660	18 33 55.3	5.073
15	15 10 3.38	2.3593	12 33 51.4	10.010	15	17 3 45.66	2.3652	18 38 56.2	4.956
16	15 12 24.96	2.3601	12 43 49.4	9.923	16	17 6 7.55	2.3643	18 43 50.0	4.839
17	15 14 46.59	2.3609	12 53 42.2	9.835	17	17 8 29.38	2.3634	18 48 36.8	4.721
18	15 17 8.26	2.3616	13 3 29.6	9.746	18	17 10 51.16	2.3625	18 53 16.6	4.604
19	15 19 29.98	2.3623	13 13 11.7	9.656	19	17 13 12.88	2.3614	18 57 49.3	4.486
20	15 21 51.74	2.3630	13 22 48.3	9.565	20	17 15 34.54	2.3604	19 2 14.9	4.368
21	15 24 13.54	2.3637	13 32 19.4	9.473	21	17 17 56.13	2.3593	19 6 33.5	4.250
22	15 26 35.39	2.3644	13 41 45.0	9.379	22	17 20 17.65	2.3582	19 10 45.0	4.132
23	15 28 57.28	2.3651	13 51 5.0	9.285	23	17 22 39.11	2.3570	19 14 49.4	4.014
24	15 31 19.20	2.3657	S. 14 0 19.3	9.190	24	17 25 0.49	2.3557	S. 19 18 46.7	3.896

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 29.					FRIDAY 30.				
0	17 25 0.49	2.3537	S. 19° 18' 46.7"	3.896	0	18 21 3.31	2.3109	S. 20° 18' 20.6"	1.082
1	17 27 21.79	2.3543	19 22 36.9	3.777	1	18 23 21.85	2.3076	20 19 22.1	0.987
2	17 29 43.01	2.3589	19 26 20.0	3.659	2	18 25 40.23	2.3051	20 20 16.7	0.853
3	17 32 4.15	2.3515	19 29 56.0	3.541	3	18 27 58.46	2.3025	20 21 4.5	0.739
4	17 34 25.20	2.3501	19 33 24.9	3.422	4	18 30 16.53	2.2999	20 21 45.4	0.625
5	17 36 46.16	2.3486	19 36 46.7	3.304	5	18 32 34.44	2.2972	20 22 19.5	0.512
6	17 39 7.03	2.3470	19 40 1.4	3.186	6	18 34 52.19	2.2945	20 22 46.8	0.399
7	17 41 27.80	2.3454	19 43 9.0	3.068	7	18 37 9.78	2.2917	20 23 7.4	0.286
8	17 43 48.47	2.3437	19 46 9.5	2.950	8	18 39 27.20	2.2889	20 23 21.2	0.174
9	17 46 9.04	2.3420	19 49 3.0	2.832	9	18 41 44.45	2.2861	20 23 28.3	0.063
10	17 48 29.50	2.3402	19 51 49.4	2.714	10	18 44 1.53	2.2832	20 23 28.7	0.049
11	17 50 49.86	2.3384	19 54 28.7	2.596	11	18 46 18.44	2.2802	20 23 22.4	0.160
12	17 53 10.11	2.3365	19 57 0.9	2.478	12	18 48 35.17	2.2772	20 23 9.5	0.270
13	17 55 30.24	2.3345	19 59 26.1	2.361	13	18 50 51.72	2.2743	20 22 50.0	0.380
14	17 57 50.25	2.3325	20 1 44.2	2.244	14	18 53 8.09	2.2713	20 22 23.9	0.490
15	18 0 10.14	2.3305	20 3 55.3	2.126	15	18 55 24.27	2.2682	20 21 51.2	0.599
16	18 2 29.91	2.3284	20 5 59.4	2.009	16	18 57 40.27	2.2651	20 21 12.0	0.708
17	18 4 49.56	2.3263	20 7 56.4	1.892	17	18 59 56.08	2.2620	20 20 26.3	0.816
18	18 7 9.08	2.3242	20 9 46.5	1.776	18	19 2 11.71	2.2588	20 19 34.1	0.923
19	18 9 28.46	2.3220	20 11 29.6	1.660	19	19 4 27.15	2.2556	20 18 35.5	1.031
20	18 11 47.71	2.3197	20 13 5.7	1.544	20	19 6 42.39	2.2524	20 17 30.4	1.137
21	18 14 6.82	2.3174	20 14 34.8	1.428	21	19 8 57.44	2.2491	20 16 19.0	1.243
22	18 16 25.79	2.3150	20 15 57.0	1.312	22	19 11 12.29	2.2458	20 15 1.2	1.349
23	18 18 44.62	2.3126	20 17 12.3	1.197	23	19 13 26.94	2.2425	20 13 37.1	1.454
24	18 21 3.31	2.3102	S. 20 18 20.6	1.082	24	19 15 41.39	2.2392	S. 20 12 6.7	1.560

PHASES OF THE MOON.

☾ Last Quarter,	d	h	m
● New Moon,	11	13	47.6
☾ First Quarter,	19	3	5.8
○ Full Moon,	25	18	21.5

☾ Apogee,	d	h
☾ Perigee,	23	19.4

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Regulus W.	105° 33' 32"	2550	107° 13' 36"	2569	108° 53' 14"	2587	110° 32' 27"	2606
	Spica W.	52 0 37	2598	53 39 35	2614	55 18 11	2630	56 56 25	2647
	α Aquilæ E.	50 15 38	2576	48 56 37	2649	47 38 55	2726	46 22 35	2810
	Fomalhaut E.	80 49 9	2816	79 15 2	2837	77 41 22	2859	76 8 11	2882
	Sun E.	118 2 48	2898	116 30 26	2918	114 58 30	2938	113 26 59	2957
2	Spica W.	65 1 53	2730	66 37 53	2747	68 13 30	2763	69 48 47	2778
	Antares W.	20 38 30	3166	22 5 20	3121	23 33 4	3089	25 1 27	3065
	Fomalhaut E.	68 29 32	2998	66 59 17	3022	65 29 32	3047	64 0 18	3073
	Sun E.	105 55 27	3053	104 26 20	3071	102 57 35	3088	101 29 11	3106
3	Spica W.	77 40 8	2854	79 13 26	2867	80 46 27	2882	82 19 9	2894
	Antares W.	32 28 31	3018	33 58 21	3018	35 28 12	3018	36 58 3	3030
	Saturn W.	22 27 14	2847	24 0 41	2858	25 33 54	2869	27 6 52	2880
	Fomalhaut E.	56 42 3	3208	55 16 3	3237	53 50 38	3268	52 25 49	3299
	Sun E.	94 12 30	3190	92 46 9	3206	91 20 7	3221	89 54 23	3236
4	Spica W.	89 58 35	2967	91 29 42	2968	93 0 35	2979	94 31 14	2989
	Antares W.	44 26 17	3011	45 55 39	3047	47 24 53	3052	48 54 2	3058
	Saturn W.	34 48 10	2935	36 19 45	2945	37 51 7	2954	39 22 17	2965
	Fomalhaut E.	45 31 20	3480	44 10 34	3533	42 50 35	3568	41 31 26	3616
	Sun E.	82 49 59	3305	81 25 53	3317	80 2 1	3329	78 38 23	3341
5	Spica W.	102 1 25	3036	103 30 53	3043	105 0 12	3052	106 29 20	3059
	Antares W.	56 17 59	3086	57 46 26	3090	59 14 48	3096	60 43 3	3101
	Saturn W.	46 55 14	3006	48 25 19	3014	49 55 15	3021	51 25 2	3027
	Fomalhaut E.	35 10 12	3932	33 57 25	4015	32 46 0	4109	31 36 7	4214
	Sun E.	71 43 20	3381	70 20 53	3400	68 58 36	3408	67 36 28	3415
6	Antares W.	68 3 0	3119	69 30 46	3123	70 58 28	3125	72 26 7	3128
	Saturn W.	58 52 7	3053	60 21 14	3057	61 50 16	3061	63 19 13	3065
	Sun E.	60 47 52	3448	59 26 30	3454	58 5 14	3459	56 44 4	3463
7	Antares W.	79 43 43	3136	81 11 9	3137	82 38 34	3138	84 5 58	3138
	Saturn W.	70 43 7	3075	72 11 47	3077	73 40 25	3078	75 9 2	3078
	α Aquilæ W.	40 23 33	4625	41 25 36	4536	42 28 56	4457	43 33 26	4384
	Sun E.	49 59 19	3480	48 38 33	3482	47 17 49	3485	45 57 8	3488
8	Antares W.	91 23 1	3135	92 50 28	3134	94 17 56	3133	95 45 26	3130
	Saturn W.	82 32 8	3075	84 0 48	3074	85 29 29	3072	86 58 13	3070
	α Aquilæ W.	49 10 54	4100	50 20 56	4055	51 31 41	4015	52 43 6	3975
	Sun E.	39 14 11	3494	37 53 40	3494	36 33 9	3496	35 12 40	3496
9	Saturn W.	94 22 34	3056	95 51 37	3053	97 20 44	3049	98 49 56	3046
	α Aquilæ W.	58 48 58	3820	60 3 40	3794	61 18 48	3770	62 34 21	3747
	Sun E.	28 30 29	3503	27 10 8	3506	25 49 51	3510	24 29 38	3515
14	Sun W.	28 3 42	3229	29 29 17	3215	30 55 8	3202	32 21 15	3189
	Pollux E.	60 13 8	2879	58 40 22	2873	57 7 29	2867	55 34 28	2861
	Mars E.	85 20 7	2886	83 47 30	2877	82 14 42	2869	80 41 44	2862
	Regulus E.	95 48 48	2813	94 14 37	2805	92 40 16	2797	91 5 44	2788
15	Sun W.	39 35 37	3128	41 3 13	3115	42 31 4	3104	43 59 9	3092
	Pollux E.	47 47 37	2837	46 13 57	2832	44 40 11	2828	43 6 20	2826
	Mars E.	72 54 15	2819	71 20 12	2811	69 45 58	2801	68 11 32	2792

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XV <sup>h</sup> .	P. L. of Diff.	XVIII <sup>h</sup> .	P. L. of Diff.	XXI <sup>h</sup> .	P. L. of Diff.
1	Regulus	W.	112° 11' 14"	2624	113° 49' 37"	2641	115° 27' 36"	2660	117° 5' 10"	2678
	Spica	W.	58 34 16	2665	60 11 43	2681	61 48 48	2698	63 25 31	2713
	α Aquilæ	E.	45 7 43	2600	43 54 23	2697	42 42 40	4102	41 32 40	4214
	Fomalhaut	E.	74 35 29	2905	73 3 16	2927	71 31 32	2950	70 0 17	2974
	SUN	E.	111 55 52	2977	110 25 10	2996	108 54 52	3015	107 24 58	3034
2	Spica	W.	71 23 44	2794	72 58 20	2810	74 32 35	2825	76 6 31	2839
	Antares	W.	26 30 20	3047	27 59 35	3034	29 29 5	3026	30 58 45	3022
	Fomalhaut	E.	62 31 35	3098	61 3 23	3125	59 35 44	3152	58 8 37	3179
	SUN	E.	100 1 9	3124	98 33 29	3141	97 6 9	3158	95 39 10	3174
3	Spica	W.	83 51 35	2909	85 23 43	2921	86 55 35	2932	88 27 13	2945
	Antares	W.	38 27 51	3023	39 57 35	3027	41 27 14	3031	42 56 48	3035
	Saturn	W.	28 39 36	2891	30 12 6	2903	31 44 21	2914	33 16 22	2924
	Fomalhaut	E.	51 1 36	3333	49 38 3	3366	48 15 8	3401	46 52 53	3438
	SUN	E.	88 28 57	3251	87 3 48	3265	85 38 56	3279	84 14 20	3292
4	Spica	W.	96 1 41	3000	97 31 54	3009	99 1 56	3018	100 31 46	3027
	Antares	W.	50 23 3	3064	51 51 57	3069	53 20 45	3075	54 49 25	3080
	Saturn	W.	40 53 14	2973	42 24 0	2982	43 54 35	2991	45 24 59	2998
	Fomalhaut	E.	40 13 9	3669	38 55 49	3797	37 39 30	3789	36 24 16	3856
	SUN	E.	77 14 59	3351	75 51 46	3362	74 28 46	3372	73 5 58	3381
5	Spica	W.	107 58 20	3066	109 27 11	3073	110 55 54	3078	112 24 30	3085
	Antares	W.	62 11 12	3104	63 39 17	3110	65 7 15	3112	66 35 10	3116
	Saturn	W.	52 54 41	3034	54 24 12	3039	55 53 37	3044	57 22 55	3049
	Fomalhaut	E.	30 27 54	4332	29 21 31	4466	28 17 9	4619	27 15 1	4797
	SUN	E.	66 14 29	3423	64 52 39	3430	63 30 56	3438	62 9 21	3442
6	Antares	W.	73 53 43	3130	75 21 16	3132	76 48 47	3133	78 16 16	3135
	Saturn	W.	64 48 6	3067	66 16 56	3070	67 45 42	3072	69 14 26	3074
	SUN	E.	55 22 58	3468	54 1 58	3471	52 41 1	3474	51 20 8	3478
7	Antares	W.	85 33 22	3138	87 0 46	3138	88 28 10	3137	89 55 35	3136
	Saturn	W.	76 37 39	3078	78 6 16	3078	79 34 52	3078	81 3 29	3076
	α Aquilæ	W.	44 39 2	4317	45 45 39	4256	46 53 12	4200	48 1 38	4147
	SUN	E.	44 36 30	3488	43 15 53	3489	41 55 17	3491	40 34 43	3493
8	Antares	W.	97 12 59	3129	98 40 33	3128	100 8 9	3124	101 35 49	3122
	Saturn	W.	88 26 59	3068	89 55 48	3065	91 24 40	3063	92 53 35	3060
	α Aquilæ	W.	53 55 10	3940	55 7 49	3908	56 21 1	3870	57 34 45	3848
	SUN	E.	33 52 11	3497	32 31 43	3498	31 11 17	3499	29 50 52	3501
9	Saturn	W.	100 19 12	3042	101 48 33	3037	103 18 0	3033	104 47 32	3029
	α Aquilæ	W.	63 50 18	3726	65 6 38	3705	66 23 20	3686	67 40 22	3668
	SUN	E.	23 9 30	3522	21 49 30	3529	20 29 38	3540	19 9 58	3551
14	SUN	W.	33 47 37	3177	35 14 14	3163	36 41 7	3151	38 8 15	3139
	Pollux	E.	54 1 19	2855	52 28 3	2851	50 54 41	2845	49 21 12	2841
	Mars	E.	79 8 36	2853	77 35 17	2845	76 1 47	2836	74 28 6	2828
	Regulus	E.	89 31 1	2780	87 56 7	2771	86 21 1	2763	84 45 44	2753
15	SUN	W.	45 27 28	3081	46 56 1	3069	48 24 48	3058	49 53 49	3047
	Pollux	E.	41 32 26	2824	39 58 29	2822	38 24 30	2822	36 50 31	2823
	Mars	E.	66 36 54	2783	65 2 4	2775	63 27 3	2765	61 51 49	2756

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
15	Regulus	E.	83° 10' 15"	2744	81° 34' 34"	2736	79° 58' 42"	2727	78° 22' 38"	2717
16	SUN	W.	51 23 4	3034	52 52 34	3024	54 22 17	3011	55 52 16	3000
	Pollux	E.	35 16 33	2825	33 42 38	2828	32 8 47	2835	30 35 4	2844
	Mars	E.	60 16 23	2747	58 40 45	2737	57 4 54	2728	55 28 51	2717
	Regulus	E.	70 19 10	2670	68 41 50	2660	67 4 17	2650	65 26 30	2640
	Spica	E.	123 55 45	2713	122 19 22	2701	120 42 44	2689	119 5 50	2678
17	SUN	W.	63 25 49	2940	64 57 17	2929	66 28 59	2916	68 0 58	2904
	Aldebaran	W.	22 56 34	2591	24 35 42	2579	26 15 6	2568	27 54 45	2557
	Mars	E.	47 25 12	2665	45 47 47	2656	44 10 8	2646	42 32 15	2635
	Regulus	E.	57 14 8	2588	55 34 56	2577	53 55 30	2566	52 15 49	2555
	Spica	E.	110 57 33	2622	109 19 8	2610	107 40 26	2599	106 1 29	2587
18	SUN	W.	75 44 46	2842	77 18 20	2828	78 52 11	2816	80 26 18	2803
	Aldebaran	W.	36 16 56	2499	37 58 10	2487	39 39 41	2476	41 21 28	2464
	Mars	E.	34 19 14	2582	32 39 54	2571	31 0 19	2560	29 20 29	2549
	Regulus	E.	43 53 31	2489	42 12 16	2487	40 30 45	2475	38 48 57	2464
	Spica	E.	97 42 43	2529	96 2 10	2517	94 21 20	2505	92 40 14	2492
19	SUN	W.	88 21 5	2739	89 56 53	2725	91 32 59	2713	93 9 21	2700
	Aldebaran	W.	49 54 36	2405	51 38 4	2392	53 21 50	2380	55 5 53	2368
	Regulus	E.	30 15 52	2405	28 32 24	2394	26 48 40	2382	25 4 39	2370
	Spica	E.	84 10 32	2434	82 27 46	2422	80 44 43	2412	79 1 25	2398
20	SUN	W.	101 15 29	2638	102 53 33	2625	104 31 54	2613	106 10 31	2601
	Aldebaran	W.	63 50 27	2309	65 36 14	2298	67 22 17	2285	69 8 38	2275
	Pollux	W.	21 21 9	2675	22 58 22	2614	24 36 58	2599	26 16 45	2518
	Spica	E.	70 20 40	2342	68 35 42	2333	66 50 30	2321	65 5 1	2311
	Antares	E.	116 9 11	2376	114 25 2	2364	112 40 35	2350	110 55 48	2337
	Saturn	E.	124 58 21	2302	123 12 25	2290	121 26 11	2279	119 39 40	2267
21	SUN	W.	114 27 36	2545	116 7 47	2535	117 48 12	2525	119 28 51	2515
	Aldebaran	W.	78 4 26	2290	79 52 24	2210	81 40 37	2200	83 29 4	2190
	Pollux	W.	34 48 44	2365	36 33 9	2343	38 18 6	2334	40 3 31	2304
	Spica	E.	56 14 3	2264	54 27 11	2256	52 40 7	2248	50 52 51	2242
	Antares	E.	102 7 21	2278	100 20 49	2266	98 34 0	2256	96 46 55	2246
	Saturn	E.	110 42 55	2212	108 54 46	2202	107 6 21	2192	105 17 41	2182
22	SUN	W.	127 55 16	2473	129 37 7	2467	131 19 7	2460	133 1 16	2455
	Aldebaran	W.	92 34 51	2147	94 24 39	2139	96 14 38	2132	98 4 49	2125
	Pollux	W.	48 56 51	2229	50 44 35	2218	52 32 36	2207	54 20 53	2196
	Mars	W.	21 7 30	2242	22 54 55	2233	24 42 34	2224	26 30 26	2216
	Spica	E.	41 54 16	2216	40 6 13	2214	38 18 7	2214	36 30 0	2215
	Antares	E.	87 48 1	2202	85 59 36	2194	84 11 0	2188	82 22 14	2181
	Saturn	E.	96 10 48	2137	94 20 46	2130	92 30 33	2123	90 40 9	2116
23	Aldebaran	W.	107 18 2	2098	109 9 4	2095	111 0 11	2092	112 51 23	2088
	Pollux	W.	63 25 46	2157	65 15 18	2152	67 4 58	2147	68 54 45	2143
	Mars	W.	35 32 29	2185	37 21 19	2180	39 10 16	2177	40 59 18	2174
	Regulus	W.	27 9 19	2100	29 0 18	2096	30 51 23	2092	32 42 34	2089
	Spica	E.	27 30 42	2252	25 43 32	2270	23 56 49	2265	22 10 42	2262
	Antares	E.	73 16 18	2150	71 26 48	2157	69 37 15	2155	67 47 39	2154
	Saturn	E.	81 25 46	2089	79 34 30	2086	77 43 9	2083	75 51 43	2080
	α Aquilæ	E.	117 59 51	2808	116 25 34	2783	114 50 44	2760	113 15 23	2738



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
15	Regulus E.	76 46 21	2708	75 9 52	2699	73 33 11	2689	71 56 17	2680
16	Sun W.	57 22 29	2688	58 52 57	2677	60 23 39	2665	61 54 36	2652
	Pollux E.	29 1 33	2655	27 28 17	2672	25 55 22	2693	24 22 54	2920
	Mars E.	53 52 34	2707	52 16 4	2697	50 39 20	2687	49 2 23	2677
	Regulus E.	63 48 30	2629	62 10 15	2620	60 31 47	2610	58 53 5	2593
	Spica E.	117 28 41	2668	115 51 18	2655	114 13 38	2644	112 35 43	2633
17	Sun W.	69 33 12	2691	71 5 42	2680	72 38 27	2667	74 11 28	2654
	Aldebaran W.	29 34 39	2645	31 14 50	2634	32 55 16	2622	34 35 56	2611
	Mars E.	40 54 8	2624	39 15 46	2614	37 37 10	2603	35 58 19	2593
	Regulus E.	50 35 52	2544	48 55 40	2533	47 15 13	2522	45 34 30	2510
	Spica E.	104 22 16	2575	102 42 47	2564	101 3 2	2552	99 23 1	2540
18	Sun W.	82 0 42	2790	83 35 23	2778	85 10 20	2765	86 45 34	2752
	Aldebaran W.	43 3 32	2452	44 45 53	2441	46 28 30	2428	48 11 25	2417
	Mars E.	27 40 24	2539	26 0 5	2529	24 19 32	2520	22 38 46	2508
	Regulus E.	37 6 53	2453	35 24 33	2441	33 41 56	2429	31 59 2	2417
	Spica E.	90 58 50	2481	89 17 10	2469	87 35 13	2458	85 53 0	2447
19	Sun W.	94 46 1	2687	96 22 58	2675	98 0 11	2662	99 37 42	2650
	Aldebaran W.	56 50 13	2357	58 34 50	2344	60 19 45	2332	62 4 58	2321
	Regulus E.	23 20 21	2359	21 35 47	2347	19 50 56	2335	18 5 48	2324
	Spica E.	77 17 48	2388	75 33 56	2376	73 49 47	2364	72 5 21	2354
20	Sun W.	107 49 24	2589	109 28 34	2578	111 7 59	2566	112 47 40	2556
	Aldebaran W.	70 55 14	2263	72 42 8	2252	74 29 18	2241	76 16 44	2231
	Pollux W.	27 57 33	2480	29 39 14	2446	31 21 43	2417	33 4 54	2389
	Spica E.	63 19 18	2301	61 33 20	2291	59 47 7	2282	58 0 41	2274
	Antares E.	109 10 42	2324	107 25 18	2312	105 39 36	2300	103 53 37	2289
	Saturn E.	117 52 52	2256	116 5 47	2245	114 18 26	2233	112 30 48	2223
21	Sun W.	121 9 43	2506	122 50 48	2497	124 32 6	2489	126 13 35	2480
	Aldebaran W.	85 17 46	2180	87 6 43	2172	88 55 53	2163	90 45 16	2155
	Pollux W.	41 49 24	2287	43 35 42	2271	45 22 24	2257	47 9 27	2243
	Spica E.	49 5 26	2235	47 17 50	2229	45 30 6	2223	43 42 13	2220
	Antares E.	94 59 36	2236	93 12 2	2227	91 24 15	2218	89 36 14	2210
	Saturn E.	103 28 46	2172	101 39 37	2163	99 50 14	2154	98 0 37	2146
22	Sun W.	134 43 33	2450	136 25 57	2446	138 8 26	2443	139 51 0	2441
	Aldebaran W.	99 55 10	2119	101 45 40	2113	103 36 19	2107	105 27 7	2103
	Pollux W.	56 9 26	2188	57 58 12	2178	59 47 12	2171	61 36 23	2163
	Mars W.	28 18 30	2208	30 6 45	2201	31 55 11	2195	33 43 46	2190
	Spica E.	34 41 55	2217	32 53 53	2221	31 5 57	2229	29 18 12	2239
	Antares E.	80 33 18	2176	78 44 14	2171	76 55 2	2165	75 5 42	2163
	Saturn E.	88 49 34	2109	86 58 49	2104	85 7 56	2099	83 16 55	2094
23	Aldebaran W.	114 42 40	2086	116 34 0	2085	118 25 22	2085	120 16 45	2085
	Pollux W.	70 44 39	2140	72 34 37	2137	74 24 40	2135	76 14 46	2134
	Mars W.	42 48 25	2172	44 37 35	2170	46 26 48	2169	48 16 2	2169
	Regulus W.	34 33 50	2087	36 25 9	2086	38 16 30	2085	40 7 53	2084
	Spica E.	20 25 21	2372	18 41 4	2429	16 58 10	2511	15 17 12	2625
	Antares E.	65 58 2	2153	64 8 24	2154	62 18 47	2155	60 29 12	2157
	Saturn E.	74 0 13	2077	72 8 39	2076	70 17 3	2075	68 25 26	2075
	α Aquilæ E.	111 39 33	2719	110 3 19	2702	108 26 42	2689	106 49 47	2677

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
24	Pollux W.	78° 4' 54"	2134	79° 55' 2"	2134	81° 45' 9"	2135	83° 35' 15"	2136
	Mars W.	50 5 16	2169	51 54 30	2170	53 43 42	2172	55 32 52	2174
	Regulus W.	41 59 17	2085	43 50 40	2085	45 42 2	2086	47 33 22	2089
	Antares E.	58 39 40	2161	56 50 14	2165	55 0 54	2170	53 11 42	2176
	Saturn E.	66 33 48	2075	64 42 11	2076	62 50 35	2077	60 59 1	2080
	α Aquilæ E.	105 12 36	2666	103 35 11	2659	101 57 36	2652	100 19 51	2648
25	Pollux W.	92 44 46	2156	94 34 20	2162	96 23 45	2169	98 13 0	2176
	Mars W.	64 37 33	2195	66 26 8	2201	68 14 34	2208	70 2 50	2215
	Regulus W.	56 48 54	2109	58 39 40	2114	60 30 18	2121	62 20 45	2128
	Antares E.	44 8 38	2227	42 20 50	2241	40 33 24	2258	38 46 22	2277
	Saturn E.	51 42 25	2101	49 51 27	2107	48 0 39	2114	46 10 1	2122
	α Aquilæ E.	92 10 26	2651	90 32 40	2657	88 55 2	2664	87 17 34	2672
26	Fomalhaut E.	126 21 46	2504	124 40 39	2492	122 59 15	2484	121 17 39	2477
	Pollux W.	107 16 2	2225	109 3 53	2236	110 51 27	2249	112 38 42	2262
	Mars W.	79 1 6	2262	80 48 2	2272	82 34 42	2284	84 21 5	2296
	Regulus W.	71 30 4	2172	73 19 14	2182	75 8 8	2193	76 56 46	2206
	Spica W.	18 48 50	2453	20 31 10	2419	22 14 18	2396	23 57 58	2381
	Antares E.	29 59 17	2413	28 16 1	2454	26 33 43	2502	24 52 32	2559
27	Saturn E.	37 0 4	2169	35 10 49	2180	33 21 52	2192	31 33 13	2206
	α Aquilæ E.	79 13 52	2741	77 38 6	2760	76 2 45	2780	74 27 51	2802
	Fomalhaut E.	112 48 6	2470	111 6 10	2472	109 24 18	2477	107 42 33	2483
	α Pegasi E.	127 0 14	2725	125 24 7	2711	123 47 42	2700	122 11 2	2692
	Mars W.	93 8 22	2303	94 52 50	2378	96 36 56	2394	98 20 40	2409
	Regulus W.	85 55 19	2270	87 42 2	2284	89 28 25	2299	91 14 26	2314
28	Spica W.	32 39 29	2370	34 23 47	2375	36 7 57	2382	37 51 57	2391
	α Aquilæ E.	66 41 18	2941	65 9 51	2976	63 39 8	3010	62 9 8	3050
	Fomalhaut E.	99 16 23	2529	97 35 50	2541	95 55 34	2553	94 15 35	2567
	α Pegasi E.	114 6 0	2684	112 28 59	2688	110 52 3	2692	109 15 13	2701
	Mars W.	106 53 41	2491	108 35 7	2509	110 16 8	2526	111 56 45	2544
	Regulus W.	99 58 53	2394	101 42 37	2410	103 25 57	2427	105 8 53	2444
29	Spica W.	46 28 19	2450	48 10 43	2402	49 52 49	2477	51 34 34	2492
	α Aquilæ E.	54 52 11	3288	53 27 45	3345	52 4 25	3408	50 42 17	3474
	Fomalhaut E.	86 0 49	2648	84 22 59	2666	82 45 33	2686	81 8 33	2705
	α Pegasi E.	101 13 55	2750	99 38 22	2763	98 3 6	2778	96 28 9	2792
	Regulus W.	113 37 29	2531	115 17 59	2548	116 58 5	2568	118 37 47	2584
	Spica W.	59 58 4	2570	61 37 40	2586	63 16 54	2603	64 55 45	2620
30	Antares W.	16 9 28	3295	17 33 45	3183	19 0 14	3101	20 28 22	3042
	α Aquilæ E.	44 11 58	3897	42 58 35	4005	41 47 0	4121	40 37 19	4251
	Fomalhaut E.	73 10 16	2810	71 36 1	2833	70 2 16	2857	68 29 2	2881
	α Pegasi E.	88 38 28	2876	87 5 39	2894	85 33 13	2913	84 1 11	2934
	SUN E.	137 18 12	2893	135 45 44	2910	134 13 38	2927	132 41 54	2944
	Spica W.	73 4 24	2702	74 41 1	2718	76 17 17	2735	77 53 11	2750
31	Antares W.	28 2 3	2910	29 34 2	2909	31 6 9	2906	32 38 20	2905
	Saturn W.	18 45 49	2685	20 22 49	2698	21 59 31	2712	23 35 55	2725
	Fomalhaut E.	60 50 49	3011	59 20 50	3040	57 51 27	3069	56 22 40	3100
	α Pegasi E.	76 27 28	3039	74 58 4	3061	73 29 7	3085	72 0 39	3107
	SUN E.	125 8 41	3032	123 39 8	3050	122 9 57	3066	120 41 6	3083

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
24	Pollux W.	85° 25' 20"	2139	87° 15' 20"	2142	89° 5' 15"	2146	90° 55' 4"	2152
	Mars W.	57 21 59	2176	59 11 2	2180	60 59 59	2184	62 48 50	2190
	Regulus W.	49 24 38	2092	51 15 50	2094	53 6 58	2099	54 57 59	2103
	Antares E.	51 22 39	2184	49 33 47	2193	47 45 9	2202	45 56 45	2214
	Saturn E.	59 7 31	2083	57 16 5	2086	55 24 45	2090	53 33 31	2096
	α Aquilæ E.	98 42 1	2645	97 4 7	2644	95 26 12	2645	93 48 18	2646
25	Pollux W.	100 2 3	2184	101 50 54	2193	103 39 32	2203	105 27 55	2214
	Mars W.	71 50 55	2223	73 38 48	2232	75 26 28	2241	77 13 54	2251
	Regulus W.	64 11 2	2136	66 1 7	2144	67 50 59	2152	69 40 39	2162
	Antares E.	36 59 48	2297	35 13 44	2321	33 28 15	2347	31 43 24	2378
	Saturn E.	44 19 35	2130	42 29 22	2138	40 39 21	2148	38 49 35	2158
	α Aquilæ E.	85 40 17	2683	84 3 14	2695	82 26 28	2709	80 50 0	2724
	Fomalhaut E.	119 35 53	2472	117 54 0	2469	116 12 3	2467	114 30 4	2468
26	Pollux W.	114 25 38	2275	116 12 14	2289	117 58 29	2304	119 44 22	2320
	Mars W.	86 7 11	2309	87 52 58	2322	89 38 26	2335	91 23 34	2349
	Regulus W.	78 45 5	2217	80 33 7	2230	82 20 50	2243	84 8 14	2256
	Spica W.	25 42 0	2371	27 26 16	2366	29 10 40	2365	30 55 5	2366
	Antares E.	23 12 41	2626	21 34 22	2710	19 57 55	2813	18 23 44	2946
	Saturn E.	29 44 54	2219	27 56 55	2224	26 9 18	2249	24 22 4	2266
	α Aquilæ E.	72 53 26	2626	71 19 32	2652	69 46 11	2680	68 13 26	2699
	Fomalhaut E.	106 0 56	2490	104 19 29	2499	102 38 14	2507	100 57 11	2518
	α Pegasi E.	120 34 11	2687	118 57 13	2683	117 20 10	2681	115 43 5	2681
27	Mars W.	100 4 2	2425	101 47 1	2441	103 29 38	2458	105 11 51	2474
	Regulus W.	93 0 5	2330	94 45 21	2345	96 30 15	2361	98 14 46	2378
	Spica W.	39 35 44	2401	41 19 17	2419	43 2 35	2424	44 45 36	2436
	α Aquilæ E.	60 39 57	2691	59 11 37	2735	57 44 10	2783	56 17 41	2823
	Fomalhaut E.	92 35 55	2583	90 56 36	2598	89 17 38	2614	87 39 2	2631
	α Pegasi E.	107 38 34	2708	106 2 5	2716	104 25 47	2727	102 49 43	2739
28	Mars W.	113 36 57	2562	115 16 44	2580	116 56 7	2598	118 35 5	2616
	Regulus W.	106 51 25	2462	108 33 32	2478	110 15 16	2496	111 56 35	2514
	Spica W.	53 15 59	2507	54 57 3	2522	56 37 45	2538	58 18 5	2553
	α Aquilæ E.	49 21 24	2546	48 1 51	2623	46 43 42	2708	45 27 3	2797
	Fomalhaut E.	79 32 0	2724	77 55 52	2745	76 20 12	2766	74 44 59	2788
	α Pegasi E.	94 53 31	2807	93 19 12	2824	91 45 15	2841	90 11 40	2859
29	Regulus W.	120 17 4	2601	121 55 58	2618	123 34 28	2636	125 12 34	2654
	Spica W.	66 34 13	2636	68 12 19	2652	69 50 3	2669	71 27 25	2686
	Antares W.	21 57 43	2997	23 27 59	2966	24 58 54	2942	26 30 19	2927
	α Aquilæ E.	39 29 41	4393	38 24 13	4549	37 21 4	4723	36 20 24	4916
	Fomalhaut E.	66 56 19	2905	65 24 7	2931	63 52 28	2958	62 21 22	2984
	α Pegasi E.	82 29 35	2954	80 58 24	2974	79 27 39	2995	77 57 20	3017
	Sun E.	131 10 31	2962	129 39 31	2980	128 8 53	2997	126 38 36	3014
30	Spica W.	79 28 45	2766	81 3 57	2782	82 38 48	2798	84 13 19	2814
	Antares W.	34 10 32	2907	35 42 42	2911	37 14 47	2915	38 46 47	2920
	Saturn W.	25 12 2	2738	26 47 51	2752	28 23 22	2766	29 58 35	2780
	Fomalhaut E.	54 54 30	3132	53 26 59	3164	52 0 7	3198	50 33 56	3224
	α Pegasi E.	70 32 38	3132	69 5 7	3158	67 38 7	3189	66 11 36	3208
	Sun E.	119 12 36	3101	117 44 27	3118	116 16 39	3134	114 49 11	3151

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be subtracted from Apparent Time.	Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	N. <sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>'</sup> <sup>"</sup>	<sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>
Sat.	1	2 34 43.64	9.545	N. 15 10 18.8	45.16	15 54.12	66.08	3 4.21	0.311
Sun.	2	2 36 32.99	9.569	15 28 15.1	44.53	15 53.88	66.16	3 11.39	0.287
Mon.	3	2 42 22.92	9.592	15 45 56.2	43.89	15 53.64	66.24	3 18.00	0.264
Tues.	4	2 46 13.41	9.616	16 3 22.0	43.24	15 53.41	66.32	3 24.05	0.240
Wed.	5	2 50 4.48	9.640	16 20 32.0	42.57	15 53.18	66.40	3 29.53	0.216
Thur.	6	2 53 56.13	9.665	16 37 25.6	41.89	15 52.95	66.49	3 34.42	0.191
Frid.	7	2 57 48.36	9.689	16 54 2.5	41.19	15 52.72	66.57	3 38.73	0.167
Sat.	8	3 1 41.18	9.713	17 10 22.8	40.49	15 52.50	66.65	3 42.46	0.143
Sun.	9	3 5 34.57	9.737	17 26 26.2	39.77	15 52.28	66.73	3 45.61	0.119
Mon.	10	3 9 28.54	9.761	17 42 12.2	39.04	15 52.07	66.81	3 48.18	0.095
Tues.	11	3 13 23.09	9.785	17 57 40.4	38.30	15 51.86	66.89	3 50.18	0.071
Wed.	12	3 17 18.23	9.809	18 12 50.7	37.54	15 51.65	66.98	3 51.60	0.047
Thur.	13	3 21 13.94	9.833	18 27 42.6	36.77	15 51.45	67.06	3 52.45	0.023
Frid.	14	3 25 10.21	9.857	18 42 15.8	35.99	15 51.25	67.14	3 52.72	0.001
Sat.	15	3 29 7.05	9.880	18 56 30.1	35.19	15 51.06	67.22	3 52.44	0.024
Sun.	16	3 33 4.45	9.903	19 10 25.1	34.38	15 50.87	67.30	3 51.60	0.047
Mon.	17	3 37 2.39	9.926	19 24 0.6	33.57	15 50.68	67.38	3 50.22	0.070
Tues.	18	3 41 0.87	9.948	19 37 16.4	32.74	15 50.50	67.46	3 48.30	0.092
Wed.	19	3 44 59.89	9.970	19 50 12.3	31.90	15 50.32	67.54	3 45.85	0.114
Thur.	20	3 48 59.44	9.992	20 2 47.9	31.05	15 50.15	67.61	3 42.86	0.136
Frid.	21	3 52 59.52	10.014	20 15 3.0	30.18	15 49.98	67.69	3 39.34	0.158
Sat.	22	3 57 0.12	10.035	20 26 57.1	29.31	15 49.81	67.77	3 35.31	0.179
Sun.	23	4 1 1.23	10.057	20 38 30.1	28.43	15 49.64	67.85	3 30.77	0.201
Mon.	24	4 5 2.85	10.078	20 49 41.9	27.54	15 49.48	67.92	3 25.72	0.222
Tues.	25	4 9 4.98	10.099	21 0 32.3	26.64	15 49.32	67.99	3 20.16	0.243
Wed.	26	4 13 7.61	10.119	21 11 0.9	25.74	15 49.16	68.06	3 14.11	0.263
Thur.	27	4 17 10.71	10.139	21 21 7.7	24.82	15 49.00	68.13	3 7.58	0.283
Frid.	28	4 21 14.29	10.159	21 30 52.4	23.90	15 48.85	68.19	3 0.57	0.303
Sat.	29	4 25 18.34	10.177	21 40 14.9	22.96	15 48.70	68.25	2 53.10	0.321
Sun.	30	4 29 22.85	10.196	21 49 14.8	22.02	15 48.55	68.31	2 45.17	0.340
Mon.	31	4 33 27.82	10.214	21 57 51.9	21.07	15 48.41	68.37	2 36.79	0.358
Tues.	32	4 37 33.22	10.232	N. 22 6 6.2	20.11	15 48.27	68.43	2 27.98	0.376

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0.18 from the Sidereal Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be added to Mean Time.	Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.			
Sat.	1	2 <sup>h</sup> 34 <sup>m</sup> 44.13 <sup>s</sup>	9.545	N. 15° 10' 21.1"	45.16	3 <sup>m</sup> 4.23 <sup>s</sup>	0.311	2 <sup>h</sup> 37 <sup>m</sup> 48.36 <sup>s</sup>
Sun.	2	2 38 33.50	9.569	15 28 17.5	44.53	3 11.41	0.287	2 41 44.91
Mon.	3	2 42 23.45	9.592	15 45 58.7	43.89	3 18.02	0.264	2 45 41.47
Tues.	4	2 46 13.96	9.616	16 3 24.5	43.24	3 24.06	0.240	2 49 38.02
Wed.	5	2 50 5.04	9.640	16 20 34.4	42.57	3 29.54	0.216	2 53 34.58
Thur.	6	2 53 56.70	9.665	16 37 27.9	41.89	3 34.43	0.191	2 57 31.13
Frid.	7	2 57 48.95	9.689	16 54 5.0	41.19	3 38.74	0.167	3 1 27.69
Sat.	8	3 1 41.78	9.713	17 10 25.4	40.49	3 42.46	0.143	3 5 24.24
Sun.	9	3 5 35.18	9.737	17 26 28.7	39.77	3 45.62	0.119	3 9 20.80
Mon.	10	3 9 29.16	9.761	17 42 14.7	39.04	3 48.19	0.095	3 13 17.35
Tues.	11	3 13 23.72	9.785	17 57 42.9	38.30	3 50.19	0.071	3 17 13.91
Wed.	12	3 17 18.86	9.809	18 12 53.1	37.54	3 51.60	0.047	3 21 10.46
Thur.	13	3 21 14.57	9.833	18 27 45.0	36.77	3 52.45	0.023	3 25 7.02
Frid.	14	3 25 10.85	9.857	18 42 18.1	35.99	3 52.72	0.001	3 29 3.57
Sat.	15	3 29 7.69	9.880	18 56 32.4	35.19	3 52.44	0.024	3 33 0.13
Sun.	16	3 33 5.09	9.903	19 10 27.3	34.38	3 51.60	0.047	3 36 56.69
Mon.	17	3 37 3.03	9.926	19 24 2.8	33.57	3 50.21	0.070	3 40 53.24
Tues.	18	3 41 1.51	9.948	19 37 18.5	32.74	3 48.29	0.092	3 44 49.80
Wed.	19	3 45 0.52	9.970	19 50 14.3	31.90	3 45.83	0.114	3 48 46.35
Thur.	20	3 49 0.06	9.992	20 2 49.8	31.05	3 42.85	0.136	3 52 42.91
Frid.	21	3 53 0.13	10.014	20 15 4.8	30.18	3 39.33	0.158	3 56 39.46
Sat.	22	3 57 0.73	10.035	20 26 58.8	29.31	3 35.29	0.179	4 0 36.02
Sun.	23	4 1 1.82	10.057	20 38 31.8	28.43	3 30.76	0.201	4 4 32.58
Mon.	24	4 5 3.42	10.078	20 49 43.5	27.54	3 25.71	0.222	4 8 29.13
Tues.	25	4 9 5.54	10.099	21 0 33.8	26.64	3 20.15	0.243	4 12 25.69
Wed.	26	4 13 8.15	10.119	21 11 2.3	25.74	3 14.10	0.263	4 16 22.25
Thur.	27	4 17 11.24	10.139	21 21 9.0	24.82	3 7.56	0.283	4 20 18.80
Frid.	28	4 21 14.80	10.159	21 30 53.6	23.90	3 0.56	0.303	4 24 15.36
Sat.	29	4 25 18.84	10.177	21 40 16.0	22.96	2 53.08	0.321	4 28 11.92
Sun.	30	4 29 23.32	10.196	21 49 15.8	22.02	2 45.15	0.340	4 32 8.47
Mon.	31	4 33 28.26	10.214	21 57 52.8	21.07	2 36.77	0.358	4 36 5.03
Tues.	32	4 37 33.63	10.232	N. 22° 6' 7.0"	20.11	2 27.96	0.376	4 40 1.59

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+ 9".8565

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	121	41° 7' 12.5	7' 10.1	145.38	+0.25	0.0035730	45.7	21 <sup>h</sup> 18 <sup>m</sup> 41.58 <sup>s</sup>
2	122	42 5 21.0	5 18.5	145.32	0.13	.0036823	45.3	21 14 45.67
3	123	43 3 28.1	3 25.5	145.26	+0.01	.0037905	44.8	21 10 49.76
4	124	44 1 33.7	1 31.0	145.21	—0.12	.0038976	44.3	21 6 53.86
5	125	44 59 38.0	59 35.1	145.15	0.25	.0040035	43.8	21 2 57.96
6	126	45 57 40.9	57 37.9	145.09	0.37	.0041080	43.2	20 59 2.05
7	127	46 55 42.4	55 39.3	145.03	0.47	.0042111	42.5	20 55 6.14
8	128	47 53 42.4	53 39.2	144.97	0.54	.0043125	41.8	20 51 10.22
9	129	48 51 41.0	51 37.6	144.91	0.58	.0044120	41.0	20 47 14.31
10	130	49 49 38.2	49 34.6	144.85	0.59	.0045095	40.2	20 43 18.40
11	131	50 47 33.9	47 30.2	144.79	0.57	.0046051	39.4	20 39 22.49
12	132	51 45 28.1	45 24.3	144.72	0.52	.0046988	38.6	20 35 26.58
13	133	52 43 20.7	43 16.8	144.66	0.44	.0047906	37.8	20 31 30.67
14	134	53 41 11.7	41 7.6	144.59	0.34	.0048805	37.0	20 27 34.76
15	135	54 39 1.0	38 56.7	144.52	0.22	.0049684	36.2	20 23 38.85
16	136	55 36 48.7	36 44.3	144.45	—0.10	.0050544	35.4	20 19 42.95
17	137	56 34 34.7	34 30.2	144.38	+0.03	.0051386	34.7	20 15 47.04
18	138	57 32 19.2	32 14.6	144.32	0.16	.0052211	34.0	20 11 51.13
19	139	58 30 2.0	29 57.2	144.25	0.29	.0053022	33.4	20 7 55.22
20	140	59 27 43.1	27 38.1	144.18	0.40	.0053819	32.9	20 3 59.31
21	141	60 25 22.6	25 17.5	144.12	0.49	.0054602	32.4	20 0 3.40
22	142	61 23 0.7	22 55.5	144.06	0.56	.0055374	31.9	19 56 7.49
23	143	62 20 37.3	20 32.0	144.00	0.60	.0056134	31.4	19 52 11.58
24	144	63 18 12.6	18 7.1	143.94	0.61	.0056882	30.9	19 48 15.67
25	145	64 15 46.7	15 41.0	143.89	0.59	.0057619	30.4	19 44 19.76
26	146	65 13 19.6	13 13.8	143.84	0.53	.0058345	30.0	19 40 23.85
27	147	66 10 51.3	10 45.4	143.80	0.44	.0059060	29.6	19 36 27.94
28	148	67 8 22.0	8 15.9	143.76	0.35	.0059764	29.1	19 32 32.02
29	149	68 5 51.7	5 45.4	143.72	0.23	.0060457	28.6	19 28 36.11
30	150	69 3 20.6	3 14.1	143.69	+0.10	.0061137	28.0	19 24 40.20
31	151	70 0 48.7	0 42.1	143.65	—0.03	.0061802	27.4	19 20 44.29
32	152	70 58 16.0	58 9.3	143.62	—0.16	0.0062451	26.7	19 16 48.38
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>h</sup> .330

## GREENWICH MEAN TIME.

## THE MOON'S

THE MOON'S									
Day of the Month.	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
1	15' 17.0	15' 11.2	55' 58.8	-1.86	55' 37.4	-1.70	<sup>h</sup> 17 <sup>m</sup> 13.1	<sup>m</sup> 2.08	<sup>d</sup> 19.4
2	15 5.9	15 1.2	55 17.9	1.53	55 0.7	1.34	18 1.9	1.98	20.4
3	14 57.1	14 53.8	54 45.9	1.14	54 33.5	0.93	18 48.4	1.89	21.4
4	14 51.1	14 49.1	54 23.6	0.71	54 16.3	0.50	19 32.9	1.82	22.4
5	14 47.8	14 47.2	54 11.5	-0.29	54 9.2	-0.09	20 16.0	1.76	23.4
6	14 47.2	14 47.8	54 9.3	+0.10	54 11.7	+0.28	20 58.2	1.75	24.4
7	14 49.1	14 50.8	54 16.2	0.46	54 22.6	0.62	21 40.3	1.77	25.4
8	14 53.1	14 55.7	54 30.9	0.75	54 40.7	0.87	22 23.1	1.81	26.4
9	14 58.8	15 2.1	54 51.8	0.98	55 4.2	1.07	23 7.3	1.88	27.4
10	15 5.7	15 9.6	55 17.4	1.14	55 31.5	1.20	23 53.4	1.97	28.4
11	15 13.6	15 17.6	55 46.2	1.24	56 1.1	1.26	<sup>h</sup> 0 <sup>m</sup> 42.0	2.08	29.4
12	15 21.8	15 25.9	56 16.3	1.27	56 31.6	1.27	0 42.0	2.08	0.8
13	15 30.1	15 34.2	56 46.9	1.27	57 2.0	1.25	1 33.3	2.19	1.8
14	15 38.3	15 42.2	57 16.8	1.23	57 31.4	1.20	2 26.9	2.28	2.8
15	15 46.1	15 49.9	57 45.6	1.17	57 59.5	1.13	3 22.3	2.33	3.8
16	15 53.5	15 57.0	58 12.9	1.10	58 25.8	1.05	4 18.3	2.34	4.8
17	16 0.4	16 3.6	58 38.1	1.00	58 49.8	0.95	5 14.1	2.30	5.8
18	16 6.6	16 9.3	59 0.8	0.88	59 10.9	0.80	6 8.9	2.25	6.8
19	16 11.8	16 13.9	59 20.0	0.71	59 27.9	0.60	7 2.4	2.20	7.8
20	16 15.7	16 17.0	59 34.3	0.47	59 39.0	+0.32	7 54.8	2.17	8.8
21	16 17.8	16 17.9	59 41.9	+0.15	59 42.6	-0.04	8 46.8	2.16	9.8
22	16 17.5	16 16.4	59 40.9	-0.24	59 36.8	0.45	9 38.8	2.18	10.8
23	16 14.6	16 12.1	59 30.2	0.66	59 21.0	0.87	10 31.5	2.22	11.8
24	16 8.9	16 5.0	59 9.2	1.08	58 55.1	1.27	11 25.3	2.26	12.8
25	16 0.6	15 55.6	58 38.9	1.44	58 20.7	1.58	12 20.0	2.29	13.8
26	15 50.3	15 44.6	58 1.0	1.70	57 40.1	1.78	13 15.0	2.29	14.8
27	15 38.7	15 32.7	57 18.5	1.82	56 56.5	1.83	14 9.6	2.25	15.8
28	15 26.8	15 21.0	56 34.7	1.80	56 13.3	1.74	15 2.7	2.17	16.8
29	15 15.4	15 10.2	55 52.9	1.65	55 33.8	1.53	15 53.6	2.07	17.8
30	15 5.4	15 1.1	55 16.3	1.39	55 0.5	1.23	16 41.9	1.96	18.8
31	14 57.4	14 54.3	54 46.9	1.04	54 35.5	0.85	17 27.8	1.86	19.8
32	14 51.9	14 50.2	54 26.5	-0.65	54 20.0	-0.43	18 11.6	1.79	20.8

## GREENWICH MEAN TIME.

## .THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 1.					MONDAY 3.				
0	19 15 41.39	2.2392	S. 20° 12' 6.7"	1.560	0	20 59 0.00	2.0635	S. 17° 8' 3.6"	5.800
1	19 17 55.64	2.2357	20 10 30.0	1.663	1	21 1 3.70	2.0599	17 2 9.3	5.940
2	19 20 9.68	2.2323	20 8 47.1	1.766	2	21 3 7.11	2.0564	16 56 10.6	6.015
3	19 22 23.52	2.2290	20 6 58.1	1.869	3	21 5 10.47	2.0528	16 50 7.5	6.088
4	19 24 37.16	2.2255	20 5 2.8	1.972	4	21 7 13.53	2.0492	16 44 0.0	6.161
5	19 26 50.58	2.2220	20 3 1.4	2.074	5	21 9 16.38	2.0457	16 37 48.2	6.222
6	19 29 3.80	2.2185	20 0 53.9	2.176	6	21 11 19.02	2.0422	16 31 32.2	6.302
7	19 31 16.80	2.2150	19 58 40.3	2.277	7	21 13 21.45	2.0388	16 25 11.9	6.371
8	19 33 29.60	2.2115	19 56 20.7	2.376	8	21 15 23.68	2.0353	16 18 47.5	6.442
9	19 35 42.18	2.2079	19 53 55.2	2.474	9	21 17 25.69	2.0318	16 12 18.8	6.512
10	19 37 54.55	2.2043	19 51 23.8	2.574	10	21 19 27.50	2.0284	16 5 46.1	6.578
11	19 40 6.70	2.2008	19 48 46.4	2.672	11	21 21 29.10	2.0250	15 59 9.3	6.647
12	19 42 18.64	2.1971	19 46 3.1	2.771	12	21 23 30.50	2.0217	15 52 28.5	6.713
13	19 44 30.35	2.1934	19 43 13.9	2.868	13	21 25 31.70	2.0183	15 45 43.7	6.780
14	19 46 41.85	2.1899	19 40 18.9	2.964	14	21 27 32.70	2.0150	15 38 54.9	6.847
15	19 48 53.14	2.1862	19 37 18.2	3.059	15	21 29 33.50	2.0117	15 32 2.1	6.912
16	19 51 4.20	2.1825	19 34 11.8	3.154	16	21 31 34.10	2.0083	15 25 5.4	6.977
17	19 53 15.04	2.1788	19 30 59.7	3.249	17	21 33 34.50	2.0049	15 18 4.9	7.040
18	19 55 25.66	2.1751	19 27 41.9	3.344	18	21 35 34.72	2.0024	15 11 0.6	7.103
19	19 57 36.05	2.1713	19 24 18.4	3.438	19	21 37 34.74	1.9989	15 3 52.5	7.167
20	19 59 46.22	2.1677	19 20 49.4	3.530	20	21 39 34.57	1.9956	14 56 40.6	7.228
21	20 1 56.17	2.1640	19 17 14.8	3.622	21	21 41 34.21	1.9924	14 49 25.1	7.289
22	20 4 5.90	2.1602	19 13 34.7	3.714	22	21 43 33.66	1.9893	14 42 5.9	7.350
23	20 6 15.40	2.1565	S. 19° 9' 49.1"	3.805	23	21 45 32.93	1.9863	S. 14° 34' 43.1"	7.410
SUNDAY 2.					TUESDAY 4.				
0	20 8 24.68	2.1528	S. 19° 5' 58.1"	3.895	0	21 47 32.02	1.9832	S. 14° 27' 16.7"	7.470
1	20 10 33.73	2.1490	19 2 1.7	3.985	1	21 49 30.92	1.9802	14 19 46.7	7.529
2	20 12 42.56	2.1452	18 57 59.9	4.073	2	21 51 29.64	1.9772	14 12 13.2	7.588
3	20 14 51.16	2.1415	18 53 52.9	4.162	3	21 53 28.19	1.9743	14 4 36.2	7.645
4	20 16 59.54	2.1377	18 49 40.5	4.251	4	21 55 26.56	1.9713	13 56 55.8	7.702
5	20 19 7.69	2.1340	18 45 22.8	4.339	5	21 57 24.75	1.9684	13 49 12.0	7.758
6	20 21 15.62	2.1302	18 41 0.0	4.423	6	21 59 22.77	1.9657	13 41 24.8	7.815
7	20 23 23.32	2.1265	18 36 32.0	4.509	7	22 1 20.63	1.9629	13 33 34.2	7.871
8	20 25 30.80	2.1227	18 31 58.9	4.594	8	22 3 18.32	1.9601	13 25 40.3	7.925
9	20 27 38.04	2.1188	18 27 20.7	4.676	9	22 5 15.84	1.9573	13 17 43.2	7.978
10	20 29 45.06	2.1152	18 22 37.4	4.763	10	22 7 13.20	1.9546	13 9 42.9	8.032
11	20 31 51.87	2.1115	18 17 49.1	4.846	11	22 9 10.30	1.9518	13 1 39.4	8.085
12	20 33 58.44	2.1077	18 12 55.9	4.927	12	22 11 7.42	1.9492	12 53 32.7	8.138
13	20 36 4.79	2.1040	18 7 57.8	5.010	13	22 13 4.29	1.9466	12 45 22.9	8.189
14	20 38 10.92	2.1002	18 2 54.7	5.092	14	22 15 1.01	1.9441	12 37 10.0	8.241
15	20 40 16.82	2.0965	17 57 46.7	5.172	15	22 16 57.58	1.9416	12 28 54.0	8.292
16	20 42 22.50	2.0928	17 52 34.0	5.252	16	22 18 54.00	1.9391	12 20 35.0	8.343
17	20 44 27.96	2.0892	17 47 16.5	5.331	17	22 20 50.27	1.9366	12 12 13.0	8.391
18	20 46 33.20	2.0854	17 41 54.3	5.410	18	22 22 46.39	1.9342	12 3 48.1	8.439
19	20 48 38.21	2.0817	17 36 27.3	5.488	19	22 24 42.37	1.9318	11 55 20.3	8.488
20	20 50 43.01	2.0779	17 30 55.7	5.565	20	22 26 38.21	1.9294	11 46 49.5	8.537
21	20 52 47.58	2.0744	17 25 19.5	5.642	21	22 28 33.90	1.9270	11 38 15.9	8.583
22	20 54 51.94	2.0708	17 19 38.7	5.718	22	22 30 29.45	1.9248	11 29 39.5	8.629
23	20 56 56.08	2.0672	17 13 53.4	5.792	23	22 32 24.88	1.9227	11 21 0.4	8.675
24	20 59 0.00	2.0635	S. 17° 8' 3.6"	5.868	24	22 34 20.17	1.9204	S. 11° 12' 18.5"	8.721



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 5.					FRIDAY 7.				
0	<sup>h</sup> 22 <sup>m</sup> 34 <sup>s</sup> 20.17	1.9204	S. 11° 12' 18.5"	8.721	0	<sup>h</sup> 0 <sup>m</sup> 4 48.86	1.8667	S. 3° 32' 5.8"	10.338
1	22 36 15.33	1.9182	11 3 33.9	8.766	1	0 6 40.86	1.8667	3 21 50.9	10.257
2	22 38 10.36	1.9162	10 54 46.6	8.810	2	0 8 32.87	1.8669	3 11 35.0	10.274
3	22 40 5.27	1.9141	10 45 56.7	8.853	3	0 10 24.89	1.8671	3 1 18.0	10.292
4	22 42 0.05	1.9121	10 37 4.2	8.897	4	0 12 16.92	1.8672	2 51 0.0	10.307
5	22 43 54.72	1.9102	10 28 9.1	8.939	5	0 14 8.95	1.8673	2 40 41.2	10.322
6	22 45 49.27	1.9082	10 19 11.5	8.982	6	0 16 1.00	1.8676	2 30 21.4	10.337
7	22 47 43.70	1.9062	10 10 11.3	9.023	7	0 17 53.06	1.8679	2 20 0.7	10.352
8	22 49 38.02	1.9044	10 1 8.7	9.063	8	0 19 45.15	1.8683	2 9 39.2	10.365
9	22 51 32.23	1.9026	9 52 3.7	9.103	9	0 21 37.26	1.8687	1 59 16.9	10.378
10	22 53 26.33	1.9008	9 42 56.3	9.143	10	0 23 29.39	1.8691	1 48 53.8	10.391
11	22 55 20.33	1.8992	9 33 46.5	9.183	11	0 25 21.55	1.8697	1 38 30.0	10.403
12	22 57 14.23	1.8975	9 24 34.3	9.222	12	0 27 13.75	1.8702	1 28 5.5	10.413
13	22 59 8.03	1.8958	9 15 19.8	9.260	13	0 29 5.97	1.8707	1 17 40.4	10.424
14	23 1 1.73	1.8942	9 6 3.1	9.297	14	0 30 58.23	1.8714	1 7 14.6	10.435
15	23 2 55.33	1.8926	8 56 44.2	9.333	15	0 32 50.54	1.8722	0 56 48.2	10.444
16	23 4 48.84	1.8911	8 47 23.1	9.370	16	0 34 42.89	1.8728	0 46 21.3	10.452
17	23 6 42.26	1.8897	8 37 59.8	9.407	17	0 36 35.28	1.8736	0 35 53.9	10.461
18	23 8 35.60	1.8882	8 28 34.3	9.442	18	0 38 27.72	1.8744	0 25 26.0	10.469
19	23 10 28.85	1.8868	8 19 6.8	9.476	19	0 40 20.21	1.8752	0 14 57.6	10.477
20	23 12 22.02	1.8855	8 9 37.2	9.510	20	0 42 12.75	1.8762	S. 0 4 28.8	10.483
21	23 14 15.11	1.8842	8 0 5.6	9.544	21	0 44 5.35	1.8772	N. 0 6 0.3	10.488
22	23 16 8.13	1.8830	7 50 31.9	9.578	22	0 45 58.01	1.8782	0 16 29.7	10.492
23	23 18 1.07	1.8817	S. 7 40 56.3	9.609	23	0 47 50.73	1.8792	N. 0 26 59.4	10.497
THURSDAY 6.					SATURDAY 8.				
0	<sup>h</sup> 23 <sup>m</sup> 19 <sup>s</sup> 53.94	1.8807	S. 7° 31' 18.8"	9.641	0	0 49 43.52	1.8804	N. 0 37 29.3	10.501
1	23 21 46.75	1.8796	7 21 39.4	9.672	1	0 51 36.38	1.8815	0 47 59.5	10.505
2	23 23 39.49	1.8784	7 11 58.1	9.704	2	0 53 29.30	1.8827	0 58 29.9	10.506
3	23 25 32.16	1.8773	7 2 15.0	9.733	3	0 55 22.30	1.8839	1 9 0.4	10.508
4	23 27 24.77	1.8764	6 52 30.1	9.763	4	0 57 15.37	1.8852	1 19 30.9	10.509
5	23 29 17.33	1.8756	6 42 43.4	9.792	5	0 59 8.53	1.8867	1 30 1.5	10.511
6	23 31 9.84	1.8747	6 32 55.0	9.821	6	1 1 1.77	1.8880	1 40 32.2	10.511
7	23 33 2.29	1.8738	6 23 4.9	9.849	7	1 2 55.09	1.8894	1 51 2.8	10.510
8	23 34 54.70	1.8731	6 13 13.1	9.877	8	1 4 48.50	1.8910	2 1 33.4	10.508
9	23 36 47.06	1.8723	6 3 19.7	9.903	9	1 6 42.01	1.8926	2 12 3.8	10.506
10	23 38 39.37	1.8716	5 53 24.7	9.930	10	1 8 35.61	1.8941	2 22 34.1	10.504
11	23 40 31.65	1.8710	5 43 28.1	9.956	11	1 10 29.30	1.8957	2 33 4.3	10.501
12	23 42 23.89	1.8703	5 33 30.0	9.981	12	1 12 23.09	1.8973	2 43 34.2	10.496
13	23 44 16.09	1.8696	5 23 30.4	10.005	13	1 14 16.98	1.8991	2 54 3.8	10.491
14	23 46 8.26	1.8693	5 13 29.4	10.029	14	1 16 10.98	1.9009	3 4 33.1	10.486
15	23 48 0.41	1.8688	5 3 26.9	10.053	15	1 18 5.09	1.9027	3 15 2.1	10.480
16	23 49 52.52	1.8683	4 53 23.0	10.076	16	1 19 59.31	1.9045	3 25 30.7	10.473
17	23 51 44.61	1.8681	4 43 17.8	10.098	17	1 21 53.63	1.9063	3 35 58.9	10.466
18	23 53 36.69	1.8678	4 33 11.2	10.121	18	1 23 48.07	1.9083	3 46 26.6	10.458
19	23 55 28.75	1.8675	4 23 3.3	10.142	19	1 25 42.63	1.9104	3 56 53.8	10.448
20	23 57 20.79	1.8672	4 12 54.2	10.162	20	1 27 37.32	1.9127	4 7 20.4	10.437
21	23 59 12.82	1.8671	4 2 43.8	10.183	21	1 29 32.12	1.9144	4 17 46.3	10.427
22	0 1 4.84	1.8669	3 52 32.2	10.202	22	1 31 27.05	1.9167	4 28 11.7	10.417
23	0 2 56.85	1.8668	3 42 19.5	10.220	23	1 33 22.12	1.9188	4 38 36.4	10.405
24	0 4 48.86	1.8667	S. 3° 32' 5.8"	10.238	24	1 35 17.31	1.9210	N. 4 49 0.3	10.392

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 9.					TUESDAY 11.				
0	1 <sup>h</sup> 35 <sup>m</sup> 17.31 <sup>s</sup>	1.9210	N. 4° 49' 0.3"	10.392	0	3 <sup>h</sup> 10 <sup>m</sup> 49.57 <sup>s</sup>	2.0734	N. 12° 38' 25.3"	8.844
1	1 37 12.64	1.9232	4 59 23.4	10.378	1	3 12 54.09	2.0773	12 47 14.4	8.792
2	1 39 8.10	1.9256	5 9 45.7	10.365	2	3 14 58.85	2.0823	12 56 0.3	8.737
3	1 41 3.71	1.9280	5 20 7.2	10.350	3	3 17 3.85	2.0853	13 4 42.8	8.681
4	1 42 59.46	1.9303	5 30 27.7	10.334	4	3 19 9.09	2.0893	13 13 22.0	8.625
5	1 44 55.35	1.9327	5 40 47.3	10.318	5	3 21 14.57	2.0933	13 21 57.8	8.568
6	1 46 51.39	1.9352	5 51 5.9	10.302	6	3 23 20.29	2.0974	13 30 30.2	8.510
7	1 48 47.58	1.9377	6 1 23.5	10.284	7	3 25 26.26	2.1014	13 38 59.0	8.451
8	1 50 43.92	1.9403	6 11 40.0	10.265	8	3 27 32.46	2.1054	13 47 24.3	8.391
9	1 52 40.42	1.9430	6 21 55.3	10.245	9	3 29 38.91	2.1096	13 55 45.9	8.330
10	1 54 37.08	1.9456	6 32 9.4	10.225	10	3 31 45.61	2.1137	14 4 3.9	8.268
11	1 56 33.89	1.9483	6 42 22.3	10.205	11	3 33 52.55	2.1177	14 12 18.1	8.204
12	1 58 30.87	1.9511	6 52 34.0	10.183	12	3 35 59.74	2.1218	14 20 28.4	8.140
13	2 0 28.02	1.9538	7 2 44.3	10.160	13	3 38 7.17	2.1260	14 28 34.9	8.077
14	2 2 25.33	1.9566	7 12 53.2	10.137	14	3 40 14.86	2.1303	14 36 37.6	8.012
15	2 4 22.81	1.9595	7 23 0.7	10.112	15	3 42 22.80	2.1344	14 44 36.3	7.945
16	2 6 20.47	1.9624	7 33 6.7	10.088	16	3 44 30.99	2.1385	14 52 31.0	7.877
17	2 8 18.30	1.9653	7 43 11.3	10.063	17	3 46 39.42	2.1427	15 0 21.5	7.808
18	2 10 16.30	1.9682	7 53 14.3	10.036	18	3 48 48.11	2.1469	15 8 7.9	7.739
19	2 12 14.49	1.9713	8 3 15.6	10.008	19	3 50 57.05	2.1511	15 15 50.2	7.659
20	2 14 12.86	1.9743	8 13 15.3	9.981	20	3 53 6.24	2.1552	15 23 28.2	7.597
21	2 16 11.41	1.9774	8 23 13.3	9.952	21	3 55 15.68	2.1594	15 31 1.8	7.534
22	2 18 10.15	1.9805	8 33 9.5	9.922	22	3 57 25.37	2.1637	15 38 31.1	7.451
23	2 20 9.07	1.9837	N. 8 43 4.0	9.891	23	3 59 35.32	2.1678	N. 15 45 55.9	7.377
MONDAY 10.					WEDNESDAY 12.				
0	2 22 8.19	1.9870	N. 8 52 56.4	9.858	0	4 1 45.51	2.1720	N. 15 53 16.3	7.309
1	2 24 7.51	1.9902	9 2 47.0	9.827	1	4 3 55.96	2.1762	16 0 32.1	7.236
2	2 26 7.01	1.9933	9 12 35.7	9.794	2	4 6 6.65	2.1804	16 7 43.4	7.150
3	2 28 6.71	1.9967	9 22 22.3	9.764	3	4 8 17.61	2.1847	16 14 50.1	7.072
4	2 30 6.62	2.0002	9 32 7.0	9.727	4	4 10 28.82	2.1888	16 21 52.0	6.992
5	2 32 6.73	2.0035	9 41 49.5	9.690	5	4 12 40.27	2.1929	16 28 49.2	6.912
6	2 34 7.04	2.0068	9 51 29.8	9.653	6	4 14 51.97	2.1971	16 35 41.5	6.832
7	2 36 7.55	2.0103	10 1 7.9	9.617	7	4 17 3.92	2.2013	16 42 29.0	6.750
8	2 38 8.27	2.0138	10 10 43.8	9.578	8	4 19 16.13	2.2056	16 49 11.5	6.668
9	2 40 9.20	2.0173	10 20 17.3	9.538	9	4 21 28.59	2.2097	16 55 49.1	6.584
10	2 42 10.35	2.0209	10 29 48.4	9.498	10	4 23 41.29	2.2138	17 2 21.6	6.500
11	2 44 11.71	2.0244	10 39 17.1	9.458	11	4 25 54.24	2.2179	17 8 49.1	6.415
12	2 46 13.28	2.0280	10 48 43.4	9.418	12	4 28 7.44	2.2220	17 15 11.4	6.330
13	2 48 15.07	2.0317	10 58 7.2	9.374	13	4 30 20.88	2.2261	17 21 28.5	6.243
14	2 50 17.08	2.0354	11 7 28.3	9.329	14	4 32 34.57	2.2302	17 27 40.4	6.153
15	2 52 19.31	2.0390	11 16 46.7	9.285	15	4 34 48.51	2.2343	17 33 46.9	6.064
16	2 54 21.76	2.0427	11 26 2.5	9.240	16	4 37 2.69	2.2383	17 39 48.1	5.974
17	2 56 24.43	2.0465	11 35 15.5	9.193	17	4 39 17.11	2.2424	17 45 43.8	5.883
18	2 58 27.34	2.0503	11 44 25.7	9.147	18	4 41 31.78	2.2464	17 51 34.1	5.792
19	3 0 30.47	2.0540	11 53 33.1	9.100	19	4 43 46.68	2.2504	17 57 18.9	5.700
20	3 2 33.82	2.0578	12 2 37.7	9.051	20	4 46 1.83	2.2544	18 2 58.1	5.607
21	3 4 37.41	2.0633	12 11 39.2	9.000	21	4 48 17.21	2.2583	18 8 31.7	5.512
22	3 6 41.23	2.0656	12 20 37.7	8.949	22	4 50 32.83	2.2623	18 13 59.6	5.417
23	3 8 45.28	2.0695	12 29 33.1	8.897	23	4 52 48.69	2.2663	18 19 21.7	5.321
24	3 10 49.57	2.0734	N. 12 38 25.3	8.844	24	4 55 4.77	2.2700	N. 18 24 38.1	5.225

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 13.					SATURDAY 15.				
0	4 55 4.77	2.2700	N.18 24 38.1	5.225	0	6 47 42.46	2.4023	N.20 30 29.6	0.196
1	4 57 21.09	2.2739	18 29 48.7	5.128	1	6 50 6.64	2.4037	20 30 14.0	0.392
2	4 59 37.64	2.2777	18 34 53.4	5.029	2	6 52 30.90	2.4048	20 29 51.0	0.446
3	5 1 54.41	2.2814	18 39 52.2	4.930	3	6 54 55.22	2.4060	20 29 20.5	0.570
4	5 4 11.41	2.2852	18 44 45.0	4.830	4	6 57 19.62	2.4072	20 28 42.6	0.694
5	5 6 28.64	2.2889	18 49 31.8	4.729	5	6 59 44.08	2.4089	20 27 57.2	0.819
6	5 8 46.08	2.2926	18 54 12.5	4.628	6	7 2 8.60	2.4091	20 27 4.3	0.943
7	5 11 3.75	2.2963	18 58 47.1	4.526	7	7 4 33.17	2.4100	20 26 4.0	1.067
8	5 13 21.63	2.2998	19 3 15.6	4.423	8	7 6 57.80	2.4108	20 24 56.2	1.192
9	5 15 39.73	2.3034	19 7 37.9	4.319	9	7 9 22.47	2.4116	20 23 40.9	1.317
10	5 17 58.04	2.3069	19 11 53.9	4.213	10	7 11 47.19	2.4123	20 22 18.1	1.442
11	5 20 16.56	2.3104	19 16 3.5	4.107	11	7 14 11.94	2.4129	20 20 47.8	1.567
12	5 22 35.29	2.3139	19 20 6.8	4.002	12	7 16 36.74	2.4136	20 19 10.0	1.692
13	5 24 54.23	2.3173	19 24 3.8	3.896	13	7 19 1.57	2.4140	20 17 24.8	1.816
14	5 27 13.36	2.3206	19 27 54.3	3.788	14	7 21 26.42	2.4143	20 15 32.1	1.941
15	5 29 32.70	2.3241	19 31 38.4	3.680	15	7 23 51.29	2.4147	20 13 31.9	2.067
16	5 31 52.24	2.3273	19 35 15.9	3.571	16	7 26 16.18	2.4150	20 11 24.1	2.192
17	5 34 11.97	2.3304	19 38 46.9	3.462	17	7 28 41.09	2.4153	20 9 8.9	2.316
18	5 36 31.89	2.3336	19 42 11.3	3.352	18	7 31 6.01	2.4154	20 6 46.2	2.440
19	5 38 52.00	2.3368	19 45 29.1	3.241	19	7 33 30.94	2.4154	20 4 16.1	2.564
20	5 41 12.30	2.3398	19 48 40.2	3.129	20	7 35 55.87	2.4155	20 1 38.5	2.688
21	5 43 32.78	2.3428	19 51 44.6	3.017	21	7 38 20.80	2.4154	19 58 53.5	2.812
22	5 45 53.44	2.3458	19 54 42.2	2.903	22	7 40 45.72	2.4153	19 56 1.0	2.937
23	5 48 14.27	2.3487	N.19 57 33.0	2.790	23	7 43 10.64	2.4153	N.19 53 1.1	3.061
FRIDAY 14.					SUNDAY 16.				
0	5 50 35.28	2.3516	N.20 0 17.0	2.677	0	7 45 35.56	2.4152	N.19 49 53.7	3.184
1	5 52 56.46	2.3544	20 2 54.2	2.562	1	7 48 0.46	2.4148	19 46 39.0	3.307
2	5 55 17.81	2.3572	20 5 24.5	2.447	2	7 50 25.33	2.4144	19 43 16.9	3.430
3	5 57 39.32	2.3599	20 7 47.9	2.332	3	7 52 50.18	2.4140	19 39 47.4	3.552
4	6 0 1.00	2.3625	20 10 4.3	2.215	4	7 55 15.01	2.4135	19 36 10.6	3.675
5	6 2 22.82	2.3650	20 12 13.7	2.098	5	7 57 39.80	2.4130	19 32 26.4	3.797
6	6 4 44.80	2.3676	20 14 16.1	1.982	6	8 0 4.57	2.4125	19 28 34.9	3.919
7	6 7 6.93	2.3701	20 16 11.5	1.864	7	8 2 29.50	2.4118	19 24 36.1	4.041
8	6 9 29.21	2.3725	20 17 59.8	1.746	8	8 4 53.99	2.4111	19 20 30.0	4.162
9	6 11 51.63	2.3748	20 19 41.0	1.627	9	8 7 18.63	2.4103	19 16 16.6	4.282
10	6 14 14.19	2.3771	20 21 15.0	1.508	10	8 9 43.23	2.4096	19 11 56.1	4.402
11	6 16 36.88	2.3793	20 22 41.9	1.388	11	8 12 7.78	2.4087	19 7 28.3	4.523
12	6 18 59.71	2.3816	20 24 1.6	1.268	12	8 14 32.27	2.4077	19 2 53.3	4.643
13	6 21 22.67	2.3836	20 25 14.1	1.148	13	8 16 56.71	2.4068	18 58 11.1	4.769
14	6 23 45.74	2.3856	20 26 19.4	1.028	14	8 19 21.09	2.4058	18 53 21.8	4.891
15	6 26 8.94	2.3876	20 27 17.4	0.906	15	8 21 45.41	2.4047	18 48 25.4	4.996
16	6 28 32.25	2.3895	20 28 8.1	0.784	16	8 24 9.66	2.4037	18 43 22.0	5.117
17	6 30 55.68	2.3913	20 28 51.5	0.662	17	8 26 33.85	2.4026	18 38 11.4	5.235
18	6 33 19.21	2.3931	20 29 27.6	0.540	18	8 28 57.97	2.4014	18 32 53.8	5.351
19	6 35 42.85	2.3948	20 29 56.4	0.418	19	8 31 22.02	2.4002	18 27 29.3	5.467
20	6 38 6.59	2.3964	20 30 17.8	0.295	20	8 33 45.99	2.3989	18 21 57.8	5.583
21	6 40 30.42	2.3979	20 30 31.8	0.172	21	8 36 9.88	2.3975	18 16 19.3	5.698
22	6 42 54.34	2.3995	20 30 38.5	0.050	22	8 38 33.69	2.3962	18 10 34.0	5.812
23	6 45 18.36	2.4010	20 30 37.8	0.074	23	8 40 57.42	2.3948	18 4 41.8	5.927
24	6 47 42.46	2.4023	N.20 30 29.6	0.198	24	8 43 21.06	2.3933	N.17 58 42.8	6.040

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 17.					WEDNESDAY 19.				
0	8 43 21.06	2.3933	N.17° 58' 42.8"	6.040	0	10 36 7.88	2.3929	N.11° 12' 30.7"	10.543
1	8 45 44.62	2.3918	17 52 37.0	6.153	1	10 38 26.00	2.3912	11 1 56.0	10.612
2	8 48 8.08	2.3903	17 46 24.4	6.266	2	10 40 44.02	2.2893	10 51 17.2	10.682
3	8 50 31.45	2.3888	17 40 5.1	6.377	3	10 43 1.92	2.2975	10 40 34.2	10.750
4	8 52 54.73	2.3872	17 33 39.2	6.487	4	10 45 19.72	2.2957	10 29 47.2	10.817
5	8 55 17.91	2.3855	17 27 6.7	6.598	5	10 47 37.41	2.2940	10 18 56.2	10.882
6	8 57 40.99	2.3839	17 20 27.5	6.708	6	10 49 55.00	2.2922	10 8 1.4	10.945
7	9 0 3.98	2.3823	17 13 41.7	6.817	7	10 52 12.48	2.2906	9 57 2.8	11.009
8	9 2 26.86	2.3805	17 6 49.5	6.924	8	10 54 29.86	2.2890	9 46 0.3	11.072
9	9 4 49.64	2.3787	16 59 50.8	7.032	9	10 56 47.16	2.2873	9 34 54.1	11.133
10	9 7 12.31	2.3770	16 52 45.7	7.138	10	10 59 4.35	2.2857	9 23 44.3	11.193
11	9 9 34.89	2.3753	16 45 34.2	7.244	11	11 1 21.45	2.2842	9 12 30.9	11.252
12	9 11 57.35	2.3734	16 38 16.4	7.349	12	11 3 38.45	2.2826	9 1 14.0	11.310
13	9 14 19.70	2.3716	16 30 52.3	7.453	13	11 5 55.36	2.2811	8 49 53.7	11.366
14	9 16 41.94	2.3698	16 23 22.0	7.557	14	11 8 12.18	2.2795	8 38 30.1	11.421
15	9 19 4.07	2.3678	16 15 45.4	7.661	15	11 10 28.90	2.2780	8 27 3.2	11.476
16	9 21 26.08	2.3660	16 8 2.7	7.762	16	11 12 45.54	2.2766	8 15 33.0	11.529
17	9 23 47.99	2.3641	16 0 13.9	7.864	17	11 15 2.09	2.2752	8 3 59.7	11.580
18	9 26 9.77	2.3621	15 52 19.0	7.964	18	11 17 18.56	2.2738	7 52 23.4	11.631
19	9 28 31.44	2.3602	15 44 18.2	8.063	19	11 19 34.95	2.2725	7 40 44.0	11.681
20	9 30 52.99	2.3582	15 36 11.4	8.162	20	11 21 51.26	2.2712	7 29 1.7	11.728
21	9 33 14.42	2.3562	15 27 58.7	8.260	21	11 24 7.49	2.2699	7 17 16.6	11.775
22	9 35 35.74	2.3543	15 19 40.2	8.357	22	11 26 23.65	2.2687	7 5 28.7	11.822
23	9 37 56.94	2.3523	N.15 11 15.9	8.453	23	11 28 39.73	2.2674	N. 6 53 38.0	11.867
TUESDAY 18.					THURSDAY 20.				
0	9 40 18.02	2.3503	N.15 2 45.8	8.549	0	11 30 55.74	2.2663	N. 6 41 44.7	11.909
1	9 42 38.98	2.3482	14 54 10.0	8.642	1	11 33 11.69	2.2652	6 29 48.9	11.951
2	9 44 59.81	2.3462	14 45 28.7	8.736	2	11 35 27.57	2.2641	6 17 50.6	11.992
3	9 47 20.53	2.3442	14 36 41.7	8.829	3	11 37 43.38	2.2630	6 5 49.8	12.033
4	9 49 41.12	2.3422	14 27 49.2	8.920	4	11 39 59.13	2.2619	5 53 46.6	12.073
5	9 52 1.60	2.3402	14 18 51.3	9.010	5	11 42 14.81	2.2610	5 41 41.2	12.107
6	9 54 21.95	2.3382	14 9 48.0	9.100	6	11 44 30.45	2.2602	5 29 33.7	12.133
7	9 56 42.19	2.3363	14 0 39.3	9.189	7	11 46 46.03	2.2592	5 17 24.0	12.178
8	9 59 2.30	2.3342	13 51 25.3	9.277	8	11 49 1.55	2.2583	5 5 12.3	12.212
9	10 1 22.29	2.3322	13 42 6.1	9.363	9	11 51 17.03	2.2575	4 52 58.6	12.244
10	10 3 42.16	2.3302	13 32 41.7	9.449	10	11 53 32.45	2.2567	4 40 43.0	12.276
11	10 6 1.91	2.3281	13 23 12.2	9.537	11	11 55 47.83	2.2560	4 28 25.7	12.306
12	10 8 21.53	2.3261	13 13 37.6	9.618	12	11 58 3.17	2.2553	4 16 6.3	12.334
13	10 10 41.04	2.3241	13 3 58.0	9.701	13	12 0 18.47	2.2546	4 3 45.4	12.361
14	10 13 0.42	2.3221	12 54 13.5	9.782	14	12 2 33.72	2.2540	3 51 23.0	12.387
15	10 15 19.69	2.3202	12 44 24.1	9.862	15	12 4 48.95	2.2535	3 38 59.0	12.412
16	10 17 38.85	2.3182	12 34 30.0	9.942	16	12 7 1.14	2.2529	3 26 33.6	12.435
17	10 19 57.88	2.3162	12 24 31.1	10.022	17	12 9 19.30	2.2524	3 14 6.8	12.457
18	10 22 16.79	2.3142	12 14 27.4	10.100	18	12 11 34.43	2.2519	3 1 38.8	12.477
19	10 24 35.59	2.3123	12 4 19.1	10.176	19	12 13 49.53	2.2515	2 49 9.6	12.497
20	10 26 54.27	2.3104	11 54 6.3	10.251	20	12 16 4.61	2.2512	2 36 39.2	12.516
21	10 29 12.84	2.3087	11 43 49.0	10.325	21	12 18 19.67	2.2508	2 24 7.7	12.533
22	10 31 31.31	2.3068	11 33 27.3	10.398	22	12 20 34.71	2.2506	2 11 35.2	12.548
23	10 33 49.65	2.3048	11 23 1.2	10.472	23	12 22 49.74	2.2503	1 59 1.9	12.562
24	10 36 7.88	2.3029	N.11 12 30.7	10.543	24	12 25 4.75	2.2504	N. 1 46 27.8	12.575

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 21.					SUNDAY 23.				
0	12 25 4.75	2.9504	N. 1° 46' 27.8"	12.575	0	14 13 36.99	2.9859	S. 8° 7' 0.9"	11.643
1	12 27 19.76	2.9499	1 33 52.9	12.587	1	14 15 54.19	2.9874	8 18 38.0	11.592
2	12 29 34.74	2.9497	1 21 17.3	12.597	2	14 18 11.48	2.9889	8 30 11.9	11.538
3	12 31 49.73	2.9496	1 8 41.2	12.607	3	14 20 28.86	2.9904	8 41 42.5	11.483
4	12 34 4.72	2.9497	0 56 4.5	12.615	4	14 22 46.33	2.9920	8 53 9.9	11.428
5	12 36 19.70	2.9497	0 43 27.4	12.621	5	14 25 3.90	2.9937	9 4 33.9	11.372
6	12 38 34.69	2.9498	0 30 50.0	12.625	6	14 27 21.57	2.9953	9 15 54.5	11.314
7	12 40 49.68	2.9498	0 18 12.4	12.628	7	14 29 39.34	2.9968	9 27 11.6	11.254
8	12 43 4.67	2.9500	N. 0 5 34.6	12.632	8	14 31 57.19	2.9983	9 38 25.0	11.193
9	12 45 19.68	2.9502	S. 0 7 3.4	12.634	9	14 34 15.14	2.9991	9 49 34.8	11.132
10	12 47 34.70	2.9504	0 19 41.5	12.634	10	14 36 33.20	2.9918	10 0 40.9	11.069
11	12 49 49.73	2.9507	0 32 19.5	12.639	11	14 38 51.35	2.9933	10 11 43.1	11.004
12	12 52 4.78	2.9510	0 44 57.3	12.638	12	14 41 9.59	2.9949	10 22 41.4	10.939
13	12 54 19.85	2.9514	0 57 34.9	12.635	13	14 43 27.94	2.9967	10 33 35.8	10.872
14	12 56 34.95	2.9517	1 10 12.3	12.619	14	14 45 46.39	2.9982	10 44 26.1	10.803
15	12 58 50.06	2.9521	1 22 49.4	12.613	15	14 48 4.94	2.9910	10 55 12.2	10.734
16	13 1 5.20	2.9527	1 35 25.9	12.604	16	14 50 23.59	2.9918	11 5 54.2	10.665
17	13 3 20.38	2.9532	1 48 1.9	12.595	17	14 52 42.35	2.9934	11 16 32.0	10.594
18	13 5 35.58	2.9536	2 0 37.3	12.584	18	14 55 1.20	2.9951	11 27 5.5	10.521
19	13 7 50.81	2.9542	2 13 12.0	12.572	19	14 57 20.16	2.9968	11 37 34.5	10.447
20	13 10 6.09	2.9549	2 25 46.0	12.559	20	14 59 39.22	2.9985	11 47 59.1	10.372
21	13 12 21.40	2.9556	2 38 19.1	12.543	21	15 1 58.38	2.9992	11 58 19.2	10.297
22	13 14 36.76	2.9562	2 50 51.2	12.527	22	15 4 17.64	2.9999	12 8 34.7	10.219
23	13 16 52.15	2.9569	S. 3 3 22.4	12.511	23	15 6 37.00	2.9996	S. 12 18 45.5	10.140
SATURDAY 22.					MONDAY 24.				
0	13 19 7.59	2.9577	S. 3 15 52.5	12.492	0	15 8 56.46	2.9959	S. 12 28 51.5	10.061
1	13 21 23.08	2.9586	3 28 21.4	12.472	1	15 11 16.02	2.9968	12 38 52.8	9.981
2	13 23 38.62	2.9594	3 40 49.1	12.450	2	15 13 35.68	2.9976	12 48 49.2	9.898
3	13 25 54.21	2.9602	3 53 15.4	12.427	3	15 15 55.45	2.9982	12 58 40.6	9.816
4	13 28 9.85	2.9612	4 5 40.3	12.402	4	15 18 15.31	2.9988	13 8 27.1	9.732
5	13 30 25.55	2.9622	4 18 3.7	12.377	5	15 20 35.27	2.9994	13 18 8.5	9.647
6	13 32 41.31	2.9632	4 30 25.6	12.352	6	15 22 55.32	2.9999	13 27 44.7	9.561
7	13 34 57.13	2.9642	4 42 45.9	12.323	7	15 25 15.47	2.9997	13 37 15.8	9.475
8	13 37 13.01	2.9652	4 55 4.4	12.293	8	15 27 35.72	2.9993	13 46 41.7	9.386
9	13 39 28.96	2.9663	5 7 21.1	12.262	9	15 29 56.07	2.9990	13 56 2.1	9.296
10	13 41 44.97	2.9673	5 19 35.9	12.231	10	15 32 16.51	2.9984	14 5 17.2	9.207
11	13 44 1.04	2.9685	5 31 48.8	12.197	11	15 34 37.04	2.9979	14 14 26.9	9.116
12	13 46 17.19	2.9697	5 43 59.6	12.162	12	15 36 57.66	2.9974	14 23 31.1	9.024
13	13 48 33.41	2.9709	5 56 8.3	12.127	13	15 39 18.37	2.9968	14 32 29.8	8.931
14	13 50 49.70	2.9722	6 8 14.8	12.088	14	15 41 39.18	2.9961	14 41 22.8	8.837
15	13 53 6.07	2.9734	6 20 18.9	12.049	15	15 44 0.07	2.9958	14 50 10.2	8.742
16	13 55 22.51	2.9747	6 32 20.7	12.010	16	15 46 21.05	2.9953	14 58 51.8	8.646
17	13 57 39.03	2.9760	6 44 20.1	11.969	17	15 48 42.11	2.9948	15 7 27.7	8.549
18	13 59 55.63	2.9773	6 56 17.0	11.926	18	15 51 3.26	2.9942	15 15 57.7	8.452
19	14 2 12.31	2.9787	7 8 11.2	11.882	19	15 53 24.49	2.9935	15 24 21.9	8.353
20	14 4 29.08	2.9801	7 20 2.8	11.837	20	15 55 45.80	2.9928	15 32 40.1	8.253
21	14 6 45.93	2.9814	7 31 51.7	11.791	21	15 58 7.19	2.9920	15 40 52.3	8.152
22	14 9 2.86	2.9829	7 43 37.7	11.742	22	16 0 28.66	2.9914	15 48 58.4	8.052
23	14 11 19.88	2.9844	7 55 20.8	11.693	23	16 2 50.20	2.9908	15 56 58.5	7.951
24	14 13 36.99	2.9859	S. 8 7 0.9	11.643	24	16 5 11.81	2.9903	S. 16 4 52.5	7.846

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 25.					THURSDAY 27.				
0	16 <sup>h</sup> 5 <sup>m</sup> 11.81	2.3608	S. 16° 4' 52.5"	7.848	0	17 <sup>h</sup> 59 <sup>m</sup> 0.23	2.3595	S. 20° 12' 6.3"	2.316
1	16 7 33.50	2.3620	16 12 40.3	7.744	1	18 1 21.76	2.3581	20 14 21.6	2.195
2	16 9 55.25	2.3631	16 20 21.8	7.639	2	18 3 43.20	2.3566	20 16 29.7	2.075
3	16 12 17.07	2.3642	16 27 57.0	7.534	3	18 6 4.54	2.3549	20 18 30.6	1.954
4	16 14 38.95	2.3652	16 35 25.9	7.429	4	18 8 25.79	2.3532	20 20 24.2	1.833
5	16 17 0.89	2.3663	16 42 48.5	7.323	5	18 10 46.93	2.3514	20 22 10.6	1.714
6	16 19 22.91	2.3672	16 50 4.7	7.216	6	18 13 7.96	2.3497	20 23 49.9	1.596
7	16 21 44.96	2.3682	16 57 14.4	7.107	7	18 15 28.88	2.3478	20 25 22.1	1.477
8	16 24 7.08	2.3692	17 4 17.5	6.998	8	18 17 49.69	2.3458	20 26 47.1	1.357
9	16 26 29.26	2.3700	17 11 14.2	6.890	9	18 20 10.38	2.3439	20 28 4.9	1.237
10	16 28 51.48	2.3707	17 18 4.3	6.780	10	18 22 30.95	2.3418	20 29 15.6	1.119
11	16 31 13.74	2.3713	17 24 47.8	6.669	11	18 24 51.39	2.3397	20 30 19.2	1.000
12	16 33 36.04	2.3720	17 31 24.6	6.558	12	18 27 11.71	2.3375	20 31 15.6	0.882
13	16 35 58.38	2.3727	17 37 54.8	6.447	13	18 29 31.89	2.3352	20 32 5.0	0.764
14	16 38 20.77	2.3734	17 44 18.2	6.334	14	18 31 51.94	2.3329	20 32 47.3	0.647
15	16 40 43.19	2.3739	17 50 34.9	6.222	15	18 34 11.84	2.3305	20 33 22.6	0.530
16	16 43 5.64	2.3744	17 56 44.8	6.108	16	18 36 31.60	2.3282	20 33 50.9	0.419
17	16 45 28.12	2.3748	18 2 47.9	5.995	17	18 38 51.22	2.3258	20 34 12.1	0.296
18	16 47 50.62	2.3752	18 8 44.2	5.881	18	18 41 10.69	2.3232	20 34 26.4	0.181
19	16 50 13.14	2.3756	18 14 33.6	5.766	19	18 43 30.00	2.3206	20 34 33.8	0.065
20	16 52 35.69	2.3759	18 20 16.1	5.650	20	18 45 49.16	2.3179	20 34 34.2	0.052
21	16 54 58.25	2.3761	18 25 51.6	5.535	21	18 48 8.15	2.3152	20 34 27.6	0.168
22	16 57 20.82	2.3762	18 31 20.3	5.420	22	18 50 26.98	2.3125	20 34 14.1	0.292
23	16 59 43.39	2.3763	S. 18 36 42.0	5.302	23	18 52 45.65	2.3097	S. 20 33 53.8	0.399
WEDNESDAY 26.					FRIDAY 28.				
0	17 2 5.98	2.3764	S. 18 41 56.6	5.185	0	18 55 4.14	2.3068	S. 20 33 26.7	0.509
1	17 4 28.57	2.3764	18 47 4.2	5.067	1	18 57 22.47	2.3040	20 32 52.7	0.623
2	17 6 51.15	2.3763	18 52 4.7	4.950	2	18 59 40.62	2.3009	20 32 11.9	0.736
3	17 9 13.73	2.3762	18 56 58.2	4.832	3	19 1 58.58	2.2978	20 31 24.4	0.847
4	17 11 36.30	2.3760	19 1 44.6	4.714	4	19 4 16.36	2.2949	20 30 30.2	0.959
5	17 13 58.85	2.3758	19 6 23.9	4.597	5	19 6 33.97	2.2918	20 29 29.3	1.071
6	17 16 21.40	2.3756	19 10 56.2	4.478	6	19 8 51.38	2.2886	20 28 21.7	1.182
7	17 18 43.92	2.3752	19 15 21.3	4.358	7	19 11 8.60	2.2854	20 27 7.5	1.292
8	17 21 6.42	2.3748	19 19 39.2	4.239	8	19 13 25.63	2.2822	20 25 46.6	1.402
9	17 23 28.90	2.3743	19 23 50.0	4.119	9	19 15 42.47	2.2790	20 24 19.2	1.512
10	17 25 51.34	2.3738	19 27 53.5	3.999	10	19 17 59.11	2.2757	20 22 45.2	1.622
11	17 28 13.75	2.3732	19 31 49.9	3.880	11	19 20 15.55	2.2723	20 21 4.6	1.730
12	17 30 36.13	2.3726	19 35 39.1	3.760	12	19 22 31.79	2.2689	20 19 17.6	1.837
13	17 32 58.46	2.3718	19 39 21.1	3.640	13	19 24 47.82	2.2654	20 17 24.2	1.943
14	17 35 20.74	2.3709	19 42 55.9	3.520	14	19 27 3.64	2.2620	20 15 24.4	2.050
15	17 37 42.97	2.3701	19 46 23.5	3.399	15	19 29 19.26	2.2585	20 13 18.2	2.156
16	17 40 5.15	2.3692	19 49 43.8	3.278	16	19 31 34.66	2.2548	20 11 5.7	2.262
17	17 42 27.27	2.3682	19 52 56.9	3.158	17	19 33 49.84	2.2513	20 8 46.8	2.367
18	17 44 49.34	2.3672	19 56 2.8	3.038	18	19 36 4.82	2.2477	20 6 21.7	2.470
19	17 47 11.34	2.3661	19 59 1.5	2.918	19	19 38 19.57	2.2440	20 3 50.4	2.573
20	17 49 33.27	2.3649	20 1 52.9	2.796	20	19 40 34.10	2.2404	20 1 12.9	2.677
21	17 51 55.13	2.3638	20 4 37.0	2.675	21	19 42 48.42	2.2368	19 58 29.2	2.779
22	17 54 16.92	2.3624	20 7 13.9	2.556	22	19 45 2.51	2.2329	19 55 39.4	2.880
23	17 56 38.62	2.3609	20 9 43.7	2.437	23	19 47 16.37	2.2292	19 52 43.6	2.980
24	17 59 0.23	2.3595	S. 20 12 6.3	2.316	24	19 49 30.01	2.2254	S. 19 49 41.8	3.080

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 29.					MONDAY 31.				
0	19 49 30.01	2.2254	S. 19° 49' 41.9"	3.080	0	21 31 43.36	2.0346	S. 15° 39' 46.8"	7.054
1	19 51 43.42	2.2215	19 46 33.8	3.180	1	21 33 45.32	2.0308	15 32 41.6	7.119
2	19 53 56.59	2.2177	19 43 20.0	3.279	2	21 35 47.06	2.0271	15 25 32.5	7.183
3	19 56 9.54	2.2139	19 40 0.3	3.377	3	21 37 48.57	2.0234	15 18 19.6	7.247
4	19 58 22.26	2.2099	19 36 34.7	3.475	4	21 39 49.87	2.0198	15 11 2.9	7.310
5	20 0 34.73	2.2060	19 33 3.3	3.573	5	21 41 50.95	2.0162	15 3 42.4	7.372
6	20 2 46.98	2.2022	19 29 26.1	3.668	6	21 43 51.81	2.0126	14 56 18.2	7.434
7	20 4 58.99	2.1982	19 25 43.1	3.764	7	21 45 52.46	2.0090	14 48 50.3	7.495
8	20 7 10.76	2.1943	19 21 54.4	3.858	8	21 47 52.89	2.0054	14 41 18.8	7.555
9	20 9 22.29	2.1902	19 18 0.1	3.952	9	21 49 53.11	2.0020	14 33 43.7	7.614
10	20 11 33.59	2.1863	19 14 0.2	4.045	10	21 51 53.13	1.9986	14 26 5.1	7.673
11	20 13 44.65	2.1822	19 9 54.7	4.138	11	21 53 52.94	1.9951	14 18 22.9	7.732
12	20 15 55.46	2.1782	19 5 43.6	4.230	12	21 55 52.54	1.9917	14 10 37.3	7.789
13	20 18 6.03	2.1742	19 1 27.1	4.321	13	21 57 51.95	1.9883	14 2 48.2	7.846
14	20 20 16.36	2.1702	18 57 5.1	4.412	14	21 59 51.14	1.9848	13 54 55.8	7.902
15	20 22 26.45	2.1661	18 52 37.7	4.502	15	22 1 50.13	1.9817	13 47 0.0	7.957
16	20 24 36.29	2.1620	18 48 4.9	4.591	16	22 3 48.94	1.9784	13 39 0.9	8.012
17	20 26 45.89	2.1580	18 43 26.8	4.678	17	22 5 47.54	1.9751	13 30 58.5	8.067
18	20 28 55.25	2.1539	18 38 43.5	4.766	18	22 7 45.95	1.9719	13 22 52.8	8.121
19	20 31 4.36	2.1498	18 33 54.9	4.853	19	22 9 44.17	1.9688	13 14 44.0	8.173
20	20 33 13.23	2.1458	18 29 1.1	4.940	20	22 11 42.20	1.9656	13 6 32.0	8.226
21	20 35 21.85	2.1417	18 24 2.1	5.025	21	22 13 40.04	1.9625	12 58 16.9	8.278
22	20 37 30.23	2.1377	18 18 58.1	5.109	22	22 15 37.70	1.9595	12 49 58.7	8.328
23	20 39 38.37	2.1336	S. 18 13 49.0	5.192	23	22 17 35.18	1.9565	S. 12 41 37.5	8.379
SUNDAY 30.					TUESDAY, JUNE 1.				
0	20 41 46.26	2.1294	S. 18 8 35.0	5.275	0	22 19 32.48	1.9535	S. 12 33 13.2	8.420
1	20 43 53.90	2.1253	18 3 16.0	5.358	PHASES OF THE MOON.				
2	20 46 1.30	2.1213	17 57 52.0	5.441					
3	20 48 8.46	2.1172	17 52 23.1	5.522					
4	20 50 15.37	2.1132	17 46 49.4	5.602					
5	20 52 22.04	2.1092	17 41 10.9	5.681	<div> <div> <div>d</div> <div>h</div> <div>m</div> </div> <div> <div>☾ Last Quarter, . . . 3 1 40.8</div> <div>● New Moon, . . . 11 4 7.2</div> <div>☽ First Quarter, . . . 18 9 29.0</div> <div>○ Full Moon, . . . 25 3 23.4</div> </div> </div>				
6	20 54 28.47	2.1052	17 35 27.7	5.760					
7	20 56 34.66	2.1011	17 29 39.7	5.839					
8	20 58 40.60	2.0969	17 23 47.0	5.916					
9	21 0 46.29	2.0929	17 17 49.8	5.992	<div> <div> <div>d</div> <div>h</div> </div> <div> <div>☾ Apogee, . . . . . 5 17.6</div> <div>☾ Perigee, . . . . . 21 9.6</div> </div> </div>				
10	21 2 51.75	2.0889	17 11 48.0	6.068					
11	21 4 56.96	2.0849	17 5 41.6	6.143					
12	21 7 1.94	2.0810	16 59 30.8	6.219					
13	21 9 6.68	2.0770	16 53 15.5	6.291					
14	21 11 11.18	2.0730	16 46 55.9	6.364					
15	21 13 15.44	2.0691	16 40 31.9	6.437					
16	21 15 19.47	2.0652	16 34 3.5	6.508					
17	21 17 23.27	2.0605	16 27 30.8	6.578					
18	21 19 26.83	2.0577	16 20 54.1	6.648					
19	21 21 30.15	2.0536	16 14 13.1	6.717					
20	21 23 33.25	2.0497	16 7 28.0	6.787					
21	21 25 36.12	2.0459	16 0 38.7	6.855					
22	21 27 38.76	2.0421	15 53 45.4	6.922					
23	21 29 41.17	2.0383	15 46 48.1	6.988					
24	21 31 43.36	2.0346	S. 15 39 46.8	7.054					

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Spica W.	85° 47' 29"	2828	87° 21' 20"	2843	88° 54' 52"	2858	90° 28' 5"	2872
	Antares W.	40 18 40	2827	41 50 24	2834	43 22 0	2842	44 53 25	2850
	Saturn W.	31 33 29	2793	33 8 6	2807	34 42 25	2821	36 16 26	2834
	Fomalhaut E.	49 8 27	3270	47 43 42	3310	46 19 42	3352	44 56 31	3394
	α Pegasi E.	64 45 36	3235	63 20 8	2961	61 55 11	3290	60 30 48	3318
	Sun E.	113 22 3	3167	111 55 14	3183	110 28 44	3198	109 2 32	3213
2	Spica W.	98 9 44	2939	99 41 14	2952	101 12 27	2963	102 43 26	2975
	Antares W.	52 27 51	2993	53 58 12	3003	55 28 21	3012	56 58 19	3020
	Saturn W.	44 2 21	2897	45 34 44	2908	47 6 53	2920	48 38 47	2930
	Fomalhaut E.	38 14 0	3665	36 56 36	3734	35 40 25	3809	34 25 32	3891
	α Pegasi E.	53 37 29	3480	52 16 42	3515	50 56 34	3554	49 37 9	3593
	Sun E.	101 55 52	3263	100 31 21	3296	99 7 5	3309	97 43 4	3321
3	Antares W.	64 25 39	3060	65 54 38	3066	67 23 29	3073	68 52 12	3079
	Saturn W.	56 15 5	2978	57 45 45	2986	59 16 15	2994	60 46 35	3001
	α Pegasi E.	43 11 45	3836	41 57 20	3885	40 43 55	3960	39 31 36	4031
	Sun E.	90 46 16	3375	89 23 31	3384	88 0 56	3393	86 38 31	3400
4	Antares W.	76 13 57	3105	77 42 0	3110	79 9 57	3114	80 37 50	3117
	Saturn W.	68 16 10	3032	69 45 43	3036	71 15 11	3041	72 44 33	3044
	Sun E.	79 48 37	3436	78 27 1	3440	77 5 30	3446	75 44 5	3450
5	Antares W.	87 56 23	3129	89 23 58	3129	90 51 32	3130	92 19 5	3130
	Saturn W.	80 10 27	3056	81 39 30	3057	83 8 32	3058	84 37 33	3058
	α Aquilæ W.	46 38 12	4230	47 46 10	4176	48 54 59	4128	50 4 34	4084
	Sun E.	68 58 4	3465	67 37 1	3466	66 15 59	3468	64 54 59	3469
6	Antares W.	99 36 53	3127	101 4 30	3126	102 32 8	3123	103 59 50	3121
	Saturn W.	92 2 46	3052	93 31 54	3051	95 1 4	3047	96 30 18	3045
	α Aquilæ W.	56 2 21	3904	57 15 37	3874	58 29 23	3846	59 43 38	3890
	Sun E.	58 10 0	3466	56 48 58	3463	55 27 53	3462	54 6 46	3459
7	Saturn W.	103 57 30	3025	105 27 12	3019	106 57 1	3014	108 26 56	3008
	α Aquilæ W.	66 1 13	3707	67 17 53	3688	68 34 53	3669	69 52 13	3651
	Fomalhaut W.	32 2 4	4069	33 12 36	3984	34 24 31	3910	35 37 41	3842
	Sun E.	47 20 21	3442	45 58 52	3438	44 37 19	3434	43 15 41	3429
8	α Aquilæ W.	76 23 24	3574	77 42 27	3559	79 1 46	3546	80 21 19	3534
	Fomalhaut W.	41 59 2	3585	43 17 53	3545	44 37 28	3508	45 57 43	3474
	α Pegasi W.	30 50 58	4699	31 51 58	4550	32 55 6	4418	34 0 11	4301
	Sun E.	36 26 10	3466	35 4 0	3402	33 41 45	3397	32 19 25	3383
13	Sun W.	22 14 22	3069	23 43 9	3048	25 12 22	3028	26 42 0	3009
	Pollux E.	38 19 50	2753	36 44 21	2756	35 8 55	2758	33 33 32	2763
	Mars E.	71 50 38	2760	70 15 17	2750	68 39 44	2742	67 4 0	2733
	Regulus E.	73 30 41	2629	71 52 25	2620	70 13 57	2611	68 35 17	2602
14	Sun W.	34 15 20	2935	35 46 54	2924	37 18 43	2912	38 50 47	2900
	Mars E.	59 2 25	2690	57 25 32	2682	55 48 28	2674	54 11 13	2665
	Regulus E.	60 19 0	2560	58 39 10	2552	56 59 9	2543	55 18 56	2535
	Spica E.	114 2 17	2595	112 23 15	2586	110 44 1	2577	109 4 35	2569
15	Sun W.	46 34 42	2847	48 8 9	2838	49 41 48	2828	51 15 40	2818
	Mars E.	46 2 11	2626	44 23 51	2618	42 45 20	2610	41 6 38	2602



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXh.	P. L. of Diff.
1	Spica W.	92° 1' 0"	2886	93° 33' 37"	2900	95° 5' 56"	2913	96° 37' 58"	2926
	Antares W.	46 24 40	2859	47 55 44	2967	49 26 38	2977	50 57 20	2985
	Saturn W.	37 50 10	2847	39 23 37	2859	40 56 48	2873	42 29 42	2884
	Fomalhaut E.	43 34 8	3442	42 12 39	3492	40 52 6	3545	39 32 32	3602
	α Pegasi E.	59 6 57	3348	57 43 41	3379	56 21 0	3411	54 58 56	3444
	SUN E.	107 36 38	3227	106 11 1	3242	104 45 42	3256	103 20 39	3270
2	Spica W.	104 14 10	2986	105 44 40	2997	107 14 57	3008	108 45 0	3018
	Antares W.	58 28 7	3028	59 57 45	3036	61 27 13	3045	62 56 30	3052
	Saturn W.	50 10 28	2940	51 41 56	2950	53 13 11	2960	54 44 14	2969
	Fomalhaut E.	33 12 3	3963	32 0 7	4065	30 49 51	4200	29 41 25	4330
	α Pegasi E.	48 18 27	3636	47 0 32	3679	45 43 23	3730	44 27 8	3780
	SUN E.	96 19 17	3332	94 55 43	3344	93 32 22	3354	92 9 13	3365
3	Antares W.	70 20 47	3086	71 49 14	3091	73 17 35	3096	74 45 49	3101
	Saturn W.	62 16 46	3008	63 46 49	3015	65 16 43	3021	66 46 30	3026
	α Pegasi E.	38 20 27	4108	37 10 33	4193	36 2 0	4285	34 54 54	4388
	SUN E.	85 16 15	3409	83 54 9	3416	82 32 11	3423	81 10 20	3430
4	Antares W.	82 5 39	3120	83 33 24	3123	85 1 6	3125	86 28 45	3126
	Saturn W.	74 13 51	3047	75 43 5	3051	77 12 15	3053	78 41 22	3055
	SUN E.	74 22 45	3454	73 1 29	3457	71 40 17	3461	70 19 9	3463
5	Antares W.	93 46 38	3130	95 14 11	3130	96 41 44	3129	98 9 18	3129
	Saturn W.	86 6 34	3058	87 35 35	3057	89 4 37	3056	90 33 41	3055
	α Aquilæ W.	51 14 51	4042	52 25 49	4004	53 37 25	3968	54 49 36	3934
	SUN E.	63 34 0	3468	62 13 0	3469	60 52 1	3468	59 31 1	3467
6	Antares W.	105 27 34	3119	106 55 21	3115	108 23 12	3112	109 51 7	3109
	Saturn W.	97 59 35	3042	99 28 56	3038	100 58 22	3034	102 27 53	3029
	α Aquilæ W.	60 58 20	3794	62 13 28	3771	63 29 0	3749	64 44 55	3727
	SUN E.	52 45 36	3456	51 24 23	3453	50 3 6	3450	48 41 46	3446
7	Saturn W.	109 56 59	3002	111 27 9	2996	112 57 27	2989	114 27 53	2983
	α Aquilæ W.	71 9 52	3635	72 27 49	3618	73 46 4	3602	75 4 36	3587
	Fomalhaut W.	36 52 0	3781	38 7 22	3725	39 23 43	3674	40 40 58	3628
	SUN E.	41 53 57	3494	40 32 8	3490	39 10 14	3415	37 48 15	3410
8	α Aquilæ W.	81 41 6	3521	83 1 7	3509	84 21 21	3498	85 41 47	3488
	Fomalhaut W.	47 18 36	3442	48 40 5	3412	50 2 8	3384	51 24 43	3357
	α Pegasi W.	35 7 3	4195	36 15 34	4100	37 25 35	4015	38 37 0	3936
	SUN E.	30 57 1	3389	29 34 32	3386	28 12 0	3384	26 49 25	3383
13	SUN W.	28 12 1	2993	29 42 23	2977	31 13 4	2963	32 44 3	2949
	Pollux E.	31 58 16	2769	30 23 8	2779	28 48 12	2792	27 13 34	2810
	Mars E.	65 28 4	2724	63 51 56	2716	62 15 37	2707	60 39 7	2698
	Regulus E.	66 56 25	2593	65 17 21	2585	63 38 6	2577	61 58 39	2568
14	SUN W.	40 23 6	2889	41 55 39	2877	43 28 27	2867	45 1 28	2857
	Mars E.	52 33 46	2657	50 56 8	2649	49 18 20	2641	47 40 21	2633
	Regulus E.	53 38 32	2627	51 57 57	2619	50 17 10	2612	48 36 13	2604
	Spica E.	107 24 57	2660	105 45 7	2651	104 5 5	2643	102 24 51	2635
15	SUN W.	52 49 45	2808	54 24 2	2801	55 58 29	2791	57 37 9	2782
	Mars E.	39 27 46	2595	37 48 44	2587	36 9 31	2580	34 30 8	2572

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
15	Regulus	E.	46° 55' 5"	2486	45° 13' 46"	2488	43° 32' 16"	2481	41° 50' 36"	2473
	Spica	E.	100 44 26	2526	99 3 49	2518	97 23 1	2511	95 42 3	2503
16	SUN	W.	59 8 0	2774	60 43 2	2765	62 18 16	2756	63 53 41	2748
	Mars	E.	32 50 34	2584	31 10 50	2558	29 30 57	2551	27 50 54	2543
	Regulus	E.	33 19 38	2437	31 36 56	2429	29 54 3	2423	28 11 1	2417
	Spica	E.	87 14 30	2465	85 32 28	2458	83 50 16	2451	82 7 54	2445
17	SUN	W.	71 53 28	2708	73 29 57	2701	75 6 36	2692	76 43 26	2686
	Pollux	W.	18 20 59	2848	19 54 24	2769	21 29 32	2705	23 6 5	2653
	Spica	E.	73 33 42	2412	71 50 24	2406	70 6 58	2399	68 23 22	2394
	Antares	E.	119 21 34	2448	117 39 7	2439	115 56 28	2431	114 13 37	2422
18	SUN	W.	84 50 0	2650	86 27 47	2643	88 5 44	2636	89 43 50	2629
	Pollux	W.	31 23 10	2491	33 4 36	2470	34 46 32	2451	36 28 54	2433
	Spica	E.	59 43 25	2368	57 59 4	2363	56 14 36	2359	54 30 2	2355
	Antares	E.	105 36 26	2383	103 52 27	2375	102 8 17	2369	100 23 58	2362
	Saturn	E.	112 41 30	2309	110 55 43	2302	109 9 46	2296	107 23 40	2289
19	SUN	W.	97 56 29	2599	99 35 25	2593	101 14 29	2588	102 53 40	2583
	Pollux	W.	45 6 12	2387	46 50 34	2357	48 35 10	2348	50 20 0	2339
	Spica	E.	45 45 54	2341	44 0 54	2340	42 15 53	2339	40 30 51	2339
	Antares	E.	91 40 4	2333	89 54 52	2327	88 9 32	2322	86 24 5	2317
	Saturn	E.	98 30 59	2261	96 44 2	2256	94 56 57	2251	93 9 45	2245
20	SUN	W.	111 11 18	2561	112 51 7	2556	114 31 2	2553	116 11 1	2550
	Pollux	W.	59 7 10	2302	60 53 7	2296	62 39 12	2291	64 25 25	2285
	Regulus	W.	22 49 45	2245	24 37 6	2241	26 24 33	2237	28 12 6	2233
	Mars	W.	21 37 15	2371	23 21 32	2367	25 5 54	2364	26 50 21	2360
	Antares	E.	77 35 13	2298	75 49 11	2295	74 3 4	2292	72 16 53	2290
	Saturn	E.	84 11 57	2223	82 24 4	2219	80 36 5	2216	78 48 1	2213
21	SUN	W.	124 31 53	2539	126 12 12	2539	127 52 31	2539	129 32 50	2539
	Pollux	W.	73 18 12	2287	75 5 0	2284	76 51 52	2282	78 38 47	2280
	Regulus	W.	37 11 5	2219	38 59 4	2217	40 47 6	2216	42 35 10	2215
	Mars	W.	35 33 41	2348	37 18 31	2346	39 3 23	2345	40 48 17	2344
	Antares	E.	63 25 25	2286	61 39 5	2287	59 52 46	2288	58 6 29	2291
	Saturn	E.	69 46 38	2200	67 58 11	2199	66 9 42	2198	64 21 11	2197
22	Pollux	W.	87 33 46	2259	89 20 46	2260	91 7 44	2262	92 54 40	2264
	Regulus	W.	51 35 43	2214	53 23 49	2216	55 11 53	2217	56 59 55	2219
	Mars	W.	49 32 54	2346	51 17 47	2346	53 2 39	2348	54 47 28	2350
	Antares	E.	49 16 11	2311	47 30 28	2318	45 44 55	2326	43 59 34	2335
	Saturn	E.	55 18 28	2198	53 29 57	2200	51 41 29	2201	49 53 3	2204
	α Aquilæ	E.	96 43 39	2772	95 8 34	2770	93 33 27	2769	91 58 19	2771
23	Pollux	W.	101 48 16	2282	103 34 42	2287	105 21 0	2293	107 7 10	2300
	Regulus	W.	65 59 7	2235	67 46 42	2239	69 34 11	2245	71 21 32	2249
	Mars	W.	63 30 32	2368	65 14 52	2373	66 59 6	2378	68 43 12	2383
	Antares	E.	35 16 55	2408	33 33 32	2429	31 50 39	2455	30 8 23	2484
	Saturn	E.	40 52 1	2223	39 4 7	2227	37 16 20	2233	35 28 42	2239
	α Aquilæ	E.	84 3 33	2795	82 28 59	2805	80 54 37	2815	79 20 29	2826
24	Regulus	W.	80 16 9	2283	82 2 34	2291	83 48 47	2299	85 34 48	2306

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
15	Regulus	E.	40° 8' 45"	9465	38° 26' 43"	9458	36° 44' 31"	9451	35° 2' 9"	9445
	Spica	E.	94 0 54	9494	92 19 33	9487	90 38 2	9480	88 56 21	9473
16	Sun	W.	65 29 17	9740	67 5 4	9739	68 41 1	9794	70 17 9	9716
	Mars	E.	26 10 40	9535	24 30 16	9529	22 49 43	9522	21 9 0	9515
	Regulus	E.	26 27 50	9410	24 44 29	9403	23 0 58	9397	21 17 19	9392
	Spica	E.	80 25 23	9438	78 42 42	9431	76 59 51	9424	75 16 51	9418
17	Sun	W.	78 20 25	9678	79 57 34	9671	81 34 43	9663	83 12 22	9657
	Pollux	W.	24 43 48	9610	26 22 30	9573	28 2 2	9542	29 42 17	9515
	Spica	E.	66 39 39	9388	64 55 47	9382	63 11 47	9378	61 27 40	9372
	Antares	E.	112 30 34	9413	110 47 18	9406	109 3 52	9398	107 20 14	9391
18	Sun	W.	91 22 5	9694	93 0 28	9617	94 39 0	9611	96 17 40	9604
	Pollux	W.	38 11 41	9418	39 54 50	9404	41 38 19	9391	43 22 7	9379
	Spica	E.	52 45 22	9351	51 0 37	9348	49 15 47	9344	47 30 52	9342
	Antares	E.	98 39 29	9356	96 54 51	9350	95 10 4	9344	93 25 9	9337
	Saturn	E.	105 37 25	9283	103 51 1	9278	102 4 29	9272	100 17 48	9266
19	Sun	W.	104 32 59	9578	106 12 24	9573	107 51 56	9569	109 31 34	9564
	Pollux	W.	52 5 3	9331	53 50 18	9322	55 35 45	9315	57 21 23	9309
	Spica	E.	38 45 49	9349	37 0 50	9344	35 15 54	9347	33 31 3	9350
	Antares	E.	84 38 31	9313	82 52 50	9309	81 7 4	9304	79 21 11	9301
	Saturn	E.	91 22 25	9241	89 34 58	9236	87 47 24	9232	85 59 44	9227
20	Sun	W.	117 51 5	9545	119 31 12	9545	121 11 23	9543	122 51 37	9541
	Pollux	W.	66 11 46	9281	67 58 14	9277	69 44 48	9272	71 31 28	9270
	Regulus	W.	29 59 45	9229	31 47 29	9227	33 35 17	9224	35 23 9	9221
	Mars	W.	28 34 53	9357	30 19 30	9355	32 4 10	9352	33 48 54	9350
	Antares	E.	70 30 39	9288	68 44 22	9287	66 58 4	9287	65 11 45	9286
	Saturn	E.	76 59 53	9210	75 11 40	9207	73 23 23	9204	71 35 2	9202
21	Sun	W.	131 13 9	9539	132 53 28	9540	134 33 46	9542	136 14 1	9544
	Pollux	W.	80 25 45	9259	82 12 45	9259	83 59 45	9258	85 46 46	9259
	Regulus	W.	44 23 15	9214	46 11 22	9214	47 59 29	9214	49 47 36	9214
	Mars	W.	42 33 12	9344	44 18 8	9344	46 3 4	9344	47 47 59	9344
	Antares	E.	56 20 16	9294	54 34 7	9296	52 48 2	9300	51 2 8	9305
	Saturn	E.	62 32 39	9196	60 44 6	9196	58 55 33	9196	57 7 0	9197
22	Pollux	W.	94 41 32	9266	96 28 21	9270	98 15 5	9273	100 1 44	9278
	Regulus	W.	58 47 54	9222	60 35 49	9225	62 23 40	9228	64 11 26	9231
	Mars	W.	56 32 14	9353	58 16 56	9357	60 1 33	9360	61 46 5	9364
	Antares	E.	42 14 26	9346	40 29 34	9358	38 44 59	9373	37 0 45	9389
	Saturn	E.	48 4 41	9208	46 16 23	9210	44 28 10	9213	42 40 2	9218
	α Aquilæ	E.	90 23 13	9772	88 48 9	9776	87 13 10	9781	85 38 17	9783
23	Pollux	W.	108 53 10	9308	110 39 1	9313	112 24 41	9322	114 10 9	9330
	Regulus	W.	73 8 46	9256	74 55 51	9262	76 42 47	9268	78 29 33	9275
	Mars	W.	70 27 11	9389	72 11 1	9396	73 54 41	9403	75 38 11	9410
	Antares	E.	28 26 47	9518	26 45 59	9559	25 6 8	9609	23 27 25	9668
	Saturn	E.	33 41 13	9246	31 53 54	9254	30 6 47	9262	28 19 52	9271
	α Aquilæ	E.	77 46 37	9842	76 13 3	9857	74 39 49	9873	73 6 56	9892
24	Regulus	W.	87 20 36	9317	89 6 11	9326	90 51 32	9336	92 36 39	9346

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
24	Mars	W.	77° 21' 31"	2419	79° 4' 39"	2426	80° 47' 36"	2436	82° 30' 20"	2445
	Spica	W.	27° 9' 51"	2426	28° 52' 48"	2419	30° 35' 56"	2414	32° 19' 11"	2412
	α Aquilæ	E.	71° 34' 27"	2912	70° 2' 24"	2935	68° 30' 49"	2959	66° 59' 45"	2985
	Fomalhaut	E.	104° 35' 49"	2545	102° 55' 39"	2550	101° 15' 35"	2554	99° 35' 37"	2560
	α Pegasi	E.	119° 12' 38"	2747	117° 37' 0"	2740	116° 1' 13"	2735	114° 25' 20"	2732
25	Regulus	W.	94° 21' 31"	2357	96° 6' 7"	2368	97° 50' 28"	2379	99° 34' 33"	2391
	Mars	W.	91° 0' 35"	2497	92° 41' 53"	2507	94° 22' 56"	2520	96° 3' 42"	2532
	Spica	W.	27° 55' 14"	2426	42° 38' 11"	2433	44° 20' 58"	2441	46° 3' 34"	2448
	α Aquilæ	E.	59° 33' 34"	3153	58° 6' 29"	3195	56° 40' 14"	3241	55° 14' 53"	3290
	Fomalhaut	E.	91° 18' 16"	2604	89° 39' 26"	2614	88° 0' 50"	2626	86° 22' 30"	2639
	α Pegasi	E.	106° 25' 27"	2738	104° 49' 37"	2742	103° 13' 53"	2748	101° 38' 17"	2755
26	Mars	W.	104° 23' 9"	2597	106° 2' 8"	2612	107° 40' 47"	2626	109° 19' 7"	2640
	Spica	W.	54° 33' 28"	2499	56° 14' 42"	2510	57° 55' 41"	2523	59° 36' 22"	2535
	α Aquilæ	E.	48° 23' 52"	3603	47° 5' 21"	3681	45° 48' 14"	3768	44° 32' 39"	3864
	Fomalhaut	E.	78° 15' 28"	2713	76° 39' 5"	2729	75° 3' 4"	2747	73° 27' 26"	2766
	α Pegasi	E.	93° 43' 2"	2905	92° 8' 41"	2918	90° 34' 36"	2931	89° 0' 49"	2946
27	Spica	W.	67° 55' 27"	2601	69° 34' 21"	2615	71° 12' 56"	2629	72° 51' 12"	2643
	Antares	W.	23° 9' 41"	2915	24° 41' 41"	2920	26° 14' 13"	2929	27° 47' 11"	2935
	Fomalhaut	E.	65° 35' 43"	2969	64° 2' 45"	2993	62° 30' 17"	2916	60° 58' 19"	2943
	α Pegasi	E.	81° 16' 46"	2927	79° 45' 2"	2946	78° 13' 41"	2965	76° 42' 45"	2985
28	Spica	W.	80° 57' 41"	2715	82° 34' 1"	2730	84° 10' 1"	2744	85° 45' 43"	2759
	Antares	W.	35° 34' 45"	2941	37° 8' 20"	2944	38° 41' 51"	2948	40° 15' 16"	2955
	Saturn	W.	28° 28' 44"	2975	30° 5' 58"	2988	31° 42' 54"	29701	33° 19' 32"	2715
	Fomalhaut	E.	53° 26' 56"	3086	51° 58' 29"	3119	50° 30' 42"	3153	49° 3' 37"	3190
	α Pegasi	E.	69° 14' 33"	3096	67° 46' 18"	3130	66° 18' 33"	3145	64° 51' 18"	3172
	α Arietis	E.	112° 7' 54"	2959	110° 34' 42"	2969	109° 1' 44"	2981	107° 29' 1"	2993
	Jupiter	E.	114° 3' 58"	2772	112° 28' 53"	2786	110° 54' 7"	2801	109° 19' 40"	2815
29	Spica	W.	93° 39' 25"	2830	95° 13' 14"	2844	96° 46' 45"	2857	98° 19' 59"	2871
	Antares	W.	48° 0' 5"	2994	49° 32' 31"	2904	51° 4' 45"	2913	52° 36' 47"	2924
	Saturn	W.	41° 18' 15"	2789	42° 53' 7"	2795	44° 27' 42"	2808	46° 2' 0"	2820
	Fomalhaut	E.	41° 59' 54"	3409	40° 37' 48"	3464	39° 16' 44"	3524	37° 56' 46"	3587
	α Pegasi	E.	57° 43' 17"	3319	56° 19' 27"	3351	54° 56' 15"	3386	53° 33' 43"	3423
	α Arietis	E.	99° 49' 12"	2954	98° 18' 1"	2965	96° 47' 5"	2978	95° 16' 25"	2991
	Jupiter	E.	101° 32' 7"	2987	99° 59' 31"	2901	98° 27' 13"	2914	96° 55' 12"	2927
	Sun	E.	132° 26' 39"	3168	130° 59' 51"	3181	129° 33' 19"	3194	128° 7' 3"	3206
30	Antares	W.	60° 13' 51"	2972	61° 44' 39"	2981	63° 15' 15"	2991	64° 45' 39"	3000
	Saturn	W.	53° 49' 28"	2980	55° 22' 12"	2992	56° 54' 41"	2903	58° 26' 56"	2914
	α Pegasi	E.	46° 52' 1"	3636	45° 34' 6"	3690	44° 17' 8"	3748	43° 1' 9"	3804
	α Arietis	E.	87° 46' 59"	3053	86° 17' 52"	3065	84° 48' 59"	3077	83° 20' 21"	3089
	Jupiter	E.	89° 19' 15"	2990	87° 48' 50"	3002	86° 18' 40"	3014	84° 48' 44"	3025
	Sun	E.	120° 59' 37"	3271	119° 34' 52"	3282	118° 10' 21"	3295	116° 46' 4"	3306
31	Antares	W.	72° 14' 55"	3043	73° 44' 15"	3050	75° 13' 26"	3058	76° 42' 27"	3065
	Saturn	W.	66° 4' 57"	2962	67° 35' 58"	2970	69° 6' 48"	2977	70° 37' 29"	2985
	α Pegasi	E.	36° 58' 11"	4189	35° 49' 35"	4291	34° 42' 34"	4404	33° 37' 16"	4530
	α Arietis	E.	76° 0' 45"	3146	74° 33' 31"	3157	73° 6' 30"	3168	71° 39' 42"	3178
	Jupiter	E.	77° 22' 21"	3075	75° 53' 41"	3083	74° 25' 11"	3092	72° 56' 52"	3100
	Sun	E.	109° 47' 46"	3358	108° 24' 41"	3366	107° 1' 46"	3375	105° 39' 1"	3384

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
24	Mars W.	84° 12' 51"	2455	85° 55' 8"	2464	87° 37' 12"	2475	89° 19' 1"	2485
	Spica W.	34 2 28	2412	35 45 45	2415	37 28 59	2417	39 12 10	2422
	α Aquilæ E.	65 29 14	3014	63 59 19	3045	62 30 2	3078	61 1 26	3114
	Fomalhaut E.	97 55 47	2567	96 16 7	2575	94 36 38	2584	92 57 21	2593
	α Pegasi E.	112 49 22	2730	111 13 22	2730	109 37 22	2731	108 1 23	2733
25	Regulus W.	101 18 21	2403	103 1 52	2415	104 45 5	2428	106 28 0	2441
	Mars W.	97 44 11	2545	99 24 22	2557	101 4 16	2570	102 43 52	2584
	Spica W.	47 46 1	2458	49 28 13	2467	51 10 12	2477	52 51 57	2487
	α Aquilæ E.	53 50 30	3343	52 27 8	3400	51 4 51	3462	49 43 44	3529
	Fomalhaut E.	84 44 28	2652	83 6 43	2666	81 29 18	2681	79 52 12	2697
	α Pegasi E.	100 2 50	2763	98 27 34	2772	96 52 30	2782	95 17 39	2793
26	Mars W.	110 57 7	2655	112 34 47	2669	114 12 8	2684	115 49 9	2699
	Spica W.	61 16 47	2547	62 56 55	2561	64 36 44	2574	66 16 15	2588
	α Aquilæ E.	43 18 43	3967	42 6 31	4081	40 56 11	4209	39 47 53	4346
	Fomalhaut E.	71 52 14	2785	70 17 27	2805	68 43 5	2825	67 9 10	2847
	α Pegasi E.	87 27 21	2861	85 54 12	2876	84 21 22	2892	82 48 53	2909
27	Spica W.	74 29 8	2657	76 6 45	2672	77 44 3	2686	79 21 2	2701
	Antares W.	29 20 27	2846	30 53 55	2842	32 27 29	2838	34 1 7	2838
	Fomalhaut E.	59 26 55	2969	57 56 3	2996	56 25 45	3024	54 56 2	3054
	α Pegasi E.	75 12 14	3006	73 42 9	3026	72 12 29	3049	70 43 17	3072
28	Spica W.	87 21 5	2773	88 56 8	2788	90 30 52	2801	92 5 18	2816
	Antares W.	41 48 33	2861	43 21 42	2870	44 54 39	2876	46 27 28	2886
	Saturn W.	34 55 52	2729	36 31 54	2741	38 7 39	2755	39 43 6	2769
	Fomalhaut E.	47 37 16	3228	46 11 40	3270	44 46 53	3313	43 22 56	3360
	α Pegasi E.	63 24 35	3198	61 58 24	3227	60 32 47	3256	59 7 44	3287
	α Arietis E.	105 56 33	2905	104 24 20	2916	102 52 22	2928	101 20 39	2941
	Jupiter E.	107 45 32	2830	106 11 43	2845	104 38 13	2859	103 5 1	2873
29	Spica W.	99 52 55	2884	101 25 34	2898	102 57 56	2910	104 30 2	2923
	Antares W.	54 8 36	2933	55 40 13	2942	57 11 38	2952	58 42 51	2962
	Saturn W.	47 36 2	2833	49 9 47	2845	50 43 16	2857	52 16 30	2869
	Fomalhaut E.	36 37 57	3657	35 20 24	3734	34 4 13	3820	32 49 31	3915
	α Pegasi E.	52 11 52	3461	50 50 44	3502	49 30 22	3545	48 10 47	3589
	α Arietis E.	93 46 1	3003	92 15 52	3016	90 45 59	3028	89 16 21	3041
	Jupiter E.	95 23 28	2941	93 52 1	2954	92 20 50	2966	90 49 55	2978
	SUN E.	126 41 3	3221	125 15 19	3234	123 49 50	3247	122 24 36	3259
30	Antares W.	66 15 52	3009	67 45 54	3018	69 15 45	3026	70 45 25	3034
	Saturn W.	59 58 57	2924	61 30 45	2933	63 2 21	2943	64 33 45	2953
	α Pegasi E.	41 46 11	3869	40 32 20	3938	39 19 39	4015	38 8 14	4099
	α Arietis E.	81 51 58	3101	80 23 49	3112	78 55 54	3124	77 28 13	3134
	Jupiter E.	83 19 2	3035	81 49 33	3046	80 20 17	3056	78 51 13	3065
	SUN E.	115 22 0	3317	113 58 8	3328	112 34 29	3338	111 11 2	3348
31	Antares W.	78 11 20	3071	79 40 5	3078	81 8 42	3083	82 37 12	3088
	Saturn W.	72 8 0	2993	73 38 22	2999	75 8 36	3005	76 38 42	3011
	α Pegasi E.	32 33 50	4669	31 32 24	4827	30 33 10	5007	29 36 20	5210
	α Arietis E.	70 13 7	3188	68 46 44	3199	67 20 34	3209	65 54 36	3220
	Jupiter E.	71 28 42	3108	70 0 42	3114	68 32 50	3122	67 5 7	3128
	SUN E.	104 16 26	3391	102 53 59	3398	101 31 40	3404	100 9 28	3411

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be subtracted from		Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.	added to Apparent Time.				
Tues.	1	<sup>h</sup> 4 <sup>m</sup> 37 <sup>s</sup> 33.22	10.232	N. 22° 6' 6.2"	20.11	15' 48.27"	68.43	<sup>m</sup> 2 <sup>s</sup> 27.98		0.376	
Wed.	2	4 41 39.03	10.249	22 13 57.6	19.15	15 48.13	68.48	2 18.74		0.393	
Thur.	3	4 45 45.24	10.265	22 21 25.8	18.18	15 48.00	68.53	2 9.11		0.409	
Frid.	4	4 49 51.83	10.281	22 28 30.6	17.21	15 47.87	68.58	1 59.09		0.425	
Sat.	5	4 53 58.80	10.296	22 35 11.9	16.23	15 47.75	68.63	1 48.71		0.440	
Sun.	6	4 58 6.11	10.309	22 41 29.6	15.24	15 47.63	68.67	1 37.99		0.453	
Mon.	7	5 2 13.73	10.322	22 47 23.5	14.24	15 47.51	68.71	1 26.96		0.466	
Tues.	8	5 6 21.65	10.334	22 52 53.4	13.24	15 47.40	68.75	1 15.62		0.478	
Wed.	9	5 10 29.85	10.345	22 57 59.1	12.23	15 47.29	68.79	1 4.01		0.489	
Thur.	10	5 14 38.29	10.355	23 2 40.6	11.22	15 47.19	68.82	0 52.16		0.499	
Frid.	11	5 18 46.96	10.364	23 6 57.9	10.21	15 47.10	68.85	0 40.09		0.508	
Sat.	12	5 22 55.83	10.371	23 10 50.8	9.19	15 47.01	68.88	0 27.82		0.515	
Sun.	13	5 27 4.86	10.378	23 14 19.2	8.17	15 46.93	68.90	0 15.37		0.522	
Mon.	14	5 31 14.05	10.383	23 17 23.0	7.14	15 46.85	68.92	0 2.77		0.527	
Tues.	15	5 35 23.36	10.388	23 20 2.1	6.11	15 46.78	68.94	0 9.95		0.532	
Wed.	16	5 39 32.75	10.391	23 22 16.5	5.08	15 46.71	68.96	0 22.74		0.535	
Thur.	17	5 43 42.21	10.394	23 24 6.1	4.05	15 46.65	68.97	0 35.60		0.538	
Frid.	18	5 47 51.71	10.395	23 25 31.0	3.02	15 46.59	68.98	0 48.52		0.539	
Sat.	19	5 52 1.23	10.395	23 26 31.0	1.99	15 46.54	68.98	1 1.46		0.539	
Sun.	20	5 56 10.77	10.395	23 27 6.2	0.96	15 46.49	68.98	1 14.40		0.539	
Mon.	21	6 0 20.28	10.394	23 27 16.6	0.08	15 46.44	68.98	1 27.32		0.538	
Tues.	22	6 4 29.76	10.392	23 27 2.2	1.11	15 46.39	68.98	1 40.21		0.536	
Wed.	23	6 8 39.18	10.389	23 26 23.0	2.15	15 46.35	68.97	1 53.03		0.533	
Thur.	24	6 12 48.51	10.385	23 25 19.0	3.18	15 46.31	68.96	2 5.77		0.529	
Frid.	25	6 16 57.75	10.381	23 23 50.2	4.21	15 46.28	68.94	2 18.41		0.525	
Sat.	26	6 21 6.87	10.375	23 21 56.7	5.24	15 46.25	68.92	2 30.94		0.519	
Sun.	27	6 25 15.85	10.369	23 19 38.5	6.26	15 46.22	68.90	2 43.32		0.513	
Mon.	28	6 29 24.66	10.362	23 16 55.8	7.28	15 46.19	68.87	2 55.55		0.506	
Tues.	29	6 33 33.30	10.354	23 13 48.7	8.30	15 46.17	68.84	3 7.61		0.498	
Wed.	30	6 37 41.75	10.345	23 10 17.1	9.32	15 46.15	68.81	3 19.47		0.489	
Thur.	31	6 41 49.99	10.336	N. 23 6 21.2	10.33	15 46.14	68.78	3 31.11		0.480	

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.19 from the Sidereal Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Equation of Time, to be added to			Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.	
		Apparent Right Ascension.			Diff. for 1 hour.	Apparent Declination.			Diff. for 1 hour.	subtracted from Mean Time.			
		h	m	s		°	'	"					m
Tues.	1	4	37	33.63	10.232	N.22	6	7.0	20.11	2	27.96	0.376	4 40 1.59
Wed.	2	4	41	39.42	10.249	22	13	58.3	19.15	2	18.72	0.393	4 43 58.14
Thur.	3	4	45	45.61	10.265	22	21	26.4	18.18	2	9.09	0.409	4 47 54.70
Frid.	4	4	49	52.17	10.281	22	28	31.1	17.21	1	59.09	0.425	4 51 51.26
Sat.	5	4	53	59.11	10.296	22	35	12.4	16.23	1	48.70	0.440	4 55 47.81
Sun.	6	4	58	6.39	10.309	22	41	30.0	15.24	1	37.98	0.453	4 59 44.37
Mon.	7	5	2	13.98	10.322	22	47	23.8	14.24	1	26.95	0.466	5 3 40.93
Tues.	8	5	6	21.87	10.334	22	52	53.7	13.24	1	15.61	0.478	5 7 37.48
Wed.	9	5	10	30.04	10.345	22	57	59.4	12.23	1	4.00	0.489	5 11 34.04
Thur.	10	5	14	38.44	10.355	23	2	40.8	11.22	0	52.16	0.499	5 15 30.60
Frid.	11	5	18	47.08	10.364	23	6	58.0	10.21	0	40.08	0.508	5 19 27.16
Sat.	12	5	22	55.91	10.371	23	10	50.8	9.19	0	27.80	0.515	5 23 23.71
Sun.	13	5	27	4.90	10.378	23	14	19.2	8.17	0	15.37	0.522	5 27 20.27
Mon.	14	5	31	14.06	10.383	23	17	23.0	7.14	0	2.77	0.527	5 31 16.83
Tues.	15	5	35	23.33	10.388	23	20	2.1	6.11	0	9.95	0.532	5 35 13.38
Wed.	16	5	39	32.68	10.391	23	22	16.4	5.08	0	22.73	0.535	5 39 9.95
Thur.	17	5	43	42.10	10.394	23	24	6.0	4.05	0	35.60	0.538	5 43 6.50
Frid.	18	5	47	51.57	10.395	23	25	30.9	3.02	0	48.51	0.539	5 47 3.06
Sat.	19	5	52	1.06	10.395	23	26	30.9	1.99	1	1.45	0.539	5 50 59.61
Sun.	20	5	56	10.56	10.395	23	27	6.1	0.96	1	14.39	0.539	5 54 56.17
Mon.	21	6	0	20.03	10.394	23	27	16.6	0.08	1	27.30	0.538	5 58 52.73
Tues.	22	6	4	29.47	10.392	23	27	2.2	1.11	1	40.19	0.536	6 2 49.28
Wed.	23	6	8	38.85	10.389	23	26	23.0	2.15	1	53.01	0.533	6 6 45.84
Thur.	24	6	12	48.15	10.385	23	25	19.0	3.18	2	5.75	0.529	6 10 42.40
Frid.	25	6	16	57.35	10.381	23	23	50.3	4.21	2	18.39	0.525	6 14 38.96
Sat.	26	6	21	6.43	10.375	23	21	56.9	5.24	2	30.92	0.519	6 18 35.51
Sun.	27	6	25	15.37	10.369	23	19	38.8	6.26	2	43.30	0.513	6 22 32.07
Mon.	28	6	29	24.15	10.362	23	16	56.2	7.28	2	55.52	0.506	6 26 28.63
Tues.	29	6	33	32.76	10.354	23	13	49.1	8.30	3	7.57	0.498	6 30 25.19
Wed.	30	6	37	41.18	10.345	23	10	17.6	9.32	3	19.44	0.489	6 34 21.74
Thur.	31	6	41	49.38	10.336	N.23	6	21.8	10.33	3	31.08	0.480	6 38 18.30

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+ 9°.8565

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+9".8565

AT GREENWICH MEAN NOON.								
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.			
		$\lambda$	$\lambda'$					
1	152	70° 58' 16.0	58' 9.3	143.62	—0.16	0.0062451	26.7	19 16 48.38
2	153	71 55 42.6	55 35.7	143.59	0.27	.0063082	26.0	19 12 52.47
3	154	72 53 8.6	53 1.5	143.56	0.37	.0063696	25.2	19 8 56.56
4	155	73 50 33.9	50 26.6	143.54	0.45	.0064290	24.3	19 5 0.64
5	156	74 47 58.6	47 51.2	143.52	0.50	.0064864	23.4	19 1 4.73
6	157	75 45 22.7	45 15.2	143.49	0.51	.0065416	22.4	18 57 8.82
7	158	76 42 46.1	42 38.4	143.46	0.50	.0065944	21.4	18 53 12.91
8	159	77 40 8.9	40 1.0	143.43	0.46	.0066447	20.4	18 49 17.00
9	160	78 37 30.9	37 22.8	143.40	0.39	.0066925	19.3	18 45 21.09
10	161	79 34 52.3	34 44.1	143.37	0.30	.0067377	18.3	18 41 25.18
11	162	80 32 12.9	32 4.6	143.34	0.19	.0067805	17.3	18 37 29.27
12	163	81 29 32.8	29 24.3	143.31	—0.07	.0068208	16.3	18 33 33.36
13	164	82 26 51.9	26 43.2	143.28	+0.06	.0068587	15.3	18 29 37.45
14	165	83 24 10.1	24 1.2	143.25	0.20	.0068942	14.3	18 25 41.54
15	166	84 21 27.5	21 18.5	143.21	0.33	.0069274	13.4	18 21 45.63
16	167	85 18 44.0	18 34.9	143.18	0.45	.0069584	12.5	18 17 49.72
17	168	86 15 59.7	15 50.4	143.14	0.55	.0069873	11.6	18 13 53.81
18	169	87 13 14.7	13 5.2	143.11	0.62	.0070142	10.8	18 9 57.90
19	170	88 10 29.0	10 19.3	143.08	0.66	.0070393	10.1	18 6 1.99
20	171	89 7 42.6	7 32.8	143.05	0.67	.0070628	9.4	18 2 6.07
21	172	90 4 55.6	4 45.7	143.03	0.66	.0070847	8.8	17 58 10.16
22	173	91 2 8.1	1 58.0	143.01	0.61	.0071051	8.1	17 54 14.25
23	174	91 59 20.1	59 9.8	142.99	0.53	.0071240	7.5	17 50 18.34
24	175	92 56 31.8	56 21.3	142.98	0.43	.0071413	6.9	17 46 22.43
25	176	93 53 43.2	53 32.6	142.97	0.31	.0071572	6.3	17 42 26.52
26	177	94 50 54.5	50 43.7	142.96	0.18	.0071717	5.7	17 38 30.61
27	178	95 48 5.6	47 54.6	142.96	+0.05	.0071847	5.1	17 34 34.70
28	179	96 45 16.7	45 5.5	142.96	—0.08	.0071962	4.4	17 30 38.78
29	180	97 42 27.9	42 16.5	142.97	0.19	.0072060	3.7	17 26 42.87
30	181	98 39 39.3	39 27.8	142.97	0.29	.0072141	3.0	17 22 46.96
31	182	99 36 50.9	36 39.3	142.98	—0.38	0.0072204	2.2	17 18 51.05

NOTE:  $\lambda$  corresponds to the true equinox of the date,  $\lambda'$  to the mean equinox of January 0d.

Diff. for 1 hour  
—0<sup>h</sup>.830



## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.

Day of the Mo.	SEMI-DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
1	14 51.9	14 50.2	54 26.5	-0.65	54 20.0	-0.43	18 11.6	1.79	20.8
2	14 49.1	14 48.7	54 16.2	-0.21	54 14.9	+0.00	18 54.1	1.75	21.8
3	14 49.1	14 50.1	54 16.2	+0.21	54 20.0	0.42	19 36.1	1.75	22.8
4	14 51.8	14 54.1	54 26.2	0.62	54 34.7	0.80	20 18.3	1.78	23.8
5	14 57.0	15 0.5	54 45.4	0.98	54 58.1	1.13	21 1.6	1.83	24.8
6	15 4.4	15 8.7	55 12.5	1.27	55 28.5	1.38	21 46.7	1.93	25.8
7	15 13.4	15 18.3	55 45.6	1.47	56 3.5	1.53	22 34.4	2.05	26.8
8	15 23.3	15 28.5	56 22.1	1.56	56 40.8	1.56	23 25.2	2.18	27.8
9	15 33.5	15 38.5	56 59.5	1.55	57 17.9	1.50	6		28.8
10	15 43.4	15 47.9	57 35.6	1.44	57 52.3	1.35	0 18.9	2.30	0.3
11	15 52.1	15 56.0	58 7.8	1.24	58 22.0	1.12	1 15.0	2.37	1.3
12	15 59.4	16 2.5	58 34.6	0.99	58 45.7	0.86	2 12.3	2.39	2.3
13	16 5.0	16 7.2	58 55.2	0.72	59 3.1	0.59	3 9.5	2.36	3.3
14	16 8.9	16 10.1	59 9.3	0.45	59 13.9	0.32	4 5.4	2.29	4.3
15	16 11.0	16 11.5	59 17.1	+0.20	59 18.9	+0.09	4 59.6	2.22	5.3
16	16 11.6	16 11.4	59 19.3	-0.02	59 18.4	-0.13	5 52.0	2.15	6.3
17	16 10.8	16 9.9	59 16.3	0.23	59 12.9	0.33	6 43.2	2.12	7.3
18	16 8.6	16 7.0	59 8.4	0.43	59 2.6	0.53	7 34.0	2.12	8.3
19	16 5.1	16 2.9	58 55.6	0.64	58 47.3	0.74	8 25.0	2.14	9.3
20	16 0.3	15 57.4	58 37.8	0.85	58 27.0	0.95	9 16.8	2.19	10.3
21	15 54.1	15 50.5	58 15.0	1.05	58 1.7	1.15	10 9.8	2.23	11.3
22	15 46.6	15 42.4	57 47.4	1.24	57 32.0	1.32	11 3.7	2.26	12.3
23	15 38.0	15 33.4	57 15.7	1.38	56 58.9	1.43	11 58.1	2.26	13.3
24	15 28.6	15 23.9	56 41.5	1.46	56 24.0	1.46	12 51.9	2.21	14.3
25	15 19.1	15 14.4	56 6.5	1.45	55 49.4	1.40	13 44.0	2.13	15.3
26	15 10.0	15 5.7	55 32.9	1.34	55 17.3	1.25	14 33.9	2.02	16.3
27	15 1.8	14 58.3	55 2.9	1.14	54 49.9	1.01	15 21.3	1.92	17.3
28	14 55.2	14 52.6	54 38.7	0.86	54 29.3	0.69	16 6.3	1.83	18.3
29	14 50.7	14 49.3	54 22.1	0.51	54 17.1	-0.32	16 49.5	1.77	19.3
30	14 48.6	14 48.6	54 14.5	-0.11	54 14.4	+0.10	17 31.5	1.74	20.3
31	14 49.2	14 50.6	54 16.8	+0.31	54 21.9	+0.52	18 13.3	1.74	21.3

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 1.					THURSDAY 3.				
0	22 19 32.48	1.9535	S. 12° 33' 13.2"	8.429	0	23 50 43.62	1.8643	S. 5° 2' 48.1"	10.119
1	22 21 29.60	1.9506	12 24 46.0	8.477	1	23 52 35.46	1.8638	4 52 40.3	10.140
2	22 23 26.55	1.9477	12 16 15.9	8.526	2	23 54 27.27	1.8632	4 52 31.3	10.160
3	22 25 23.32	1.9448	12 7 42.9	8.574	3	23 56 19.05	1.8627	4 32 21.1	10.180
4	22 27 19.92	1.9420	11 59 7.0	8.622	4	23 58 10.79	1.8622	4 22 9.7	10.200
5	22 29 16.36	1.9392	11 50 28.3	8.667	5	0 0 2.51	1.8618	4 11 57.1	10.220
6	22 31 12.63	1.9365	11 41 46.9	8.713	6	0 1 54.20	1.8614	4 1 43.3	10.239
7	22 33 8.74	1.9338	11 33 2.7	8.759	7	0 3 45.88	1.8612	3 51 28.4	10.257
8	22 35 4.69	1.9312	11 24 15.8	8.804	8	0 5 37.54	1.8608	3 41 12.4	10.275
9	22 37 0.49	1.9287	11 15 26.2	8.848	9	0 7 29.18	1.8606	3 30 55.4	10.292
10	22 38 56.13	1.9260	11 6 34.1	8.891	10	0 9 20.81	1.8605	3 20 37.4	10.308
11	22 40 51.61	1.9235	10 57 39.3	8.935	11	0 11 12.44	1.8604	3 10 18.4	10.324
12	22 42 46.95	1.9211	10 48 41.9	8.977	12	0 13 4.06	1.8603	2 59 58.5	10.340
13	22 44 42.14	1.9187	10 39 42.0	9.019	13	0 14 55.68	1.8603	2 49 37.6	10.355
14	22 46 37.19	1.9163	10 30 39.6	9.060	14	0 16 47.30	1.8604	2 39 15.9	10.368
15	22 48 32.10	1.9140	10 21 34.8	9.099	15	0 18 38.93	1.8606	2 28 53.4	10.382
16	22 50 26.87	1.9117	10 12 27.7	9.139	16	0 20 30.57	1.8608	2 18 30.0	10.396
17	22 52 21.50	1.9094	10 3 18.1	9.180	17	0 22 22.22	1.8609	2 8 5.9	10.408
18	22 54 16.00	1.9074	9 54 6.1	9.214	18	0 24 13.88	1.8612	1 57 41.0	10.421
19	22 56 10.37	1.9052	9 44 51.8	9.257	19	0 26 5.56	1.8615	1 47 15.4	10.433
20	22 58 4.61	1.9030	9 35 35.3	9.293	20	0 27 57.26	1.8619	1 36 49.2	10.442
21	22 59 58.73	1.9009	9 26 16.6	9.330	21	0 29 48.99	1.8623	1 26 22.3	10.454
22	23 1 52.72	1.8989	9 16 55.7	9.367	22	0 31 40.74	1.8628	1 15 54.7	10.464
23	23 3 46.60	1.8970	S. 9° 7' 32.6"	9.403	23	0 33 32.53	1.8635	S. 1° 5' 26.6"	10.473
WEDNESDAY 2.					FRIDAY 4.				
0	23 5 40.36	1.8951	S. 8° 58' 7.3"	9.439	0	0 35 24.36	1.8641	S. 0° 54' 58.0"	10.481
1	23 7 34.01	1.8932	8 48 39.9	9.473	1	0 37 16.22	1.8647	0 44 28.9	10.489
2	23 9 27.54	1.8913	8 39 10.6	9.507	2	0 39 8.13	1.8655	0 33 59.3	10.497
3	23 11 20.97	1.8897	8 29 39.1	9.542	3	0 41 0.08	1.8662	0 23 29.2	10.504
4	23 13 14.30	1.8880	8 20 5.6	9.574	4	0 42 52.07	1.8670	0 12 58.8	10.510
5	23 15 7.53	1.8862	8 10 30.2	9.607	5	0 44 44.12	1.8679	S. 0° 2' 28.0"	10.516
6	23 17 0.65	1.8846	8 0 52.8	9.639	6	0 46 36.22	1.8688	N. 0° 8' 3.1"	10.521
7	23 18 53.68	1.8831	7 51 13.5	9.670	7	0 48 28.38	1.8698	0 18 34.5	10.526
8	23 20 46.62	1.8816	7 41 32.4	9.700	8	0 50 20.60	1.8709	0 29 6.2	10.530
9	23 22 39.47	1.8801	7 31 49.5	9.730	9	0 52 12.89	1.8721	0 39 38.1	10.533
10	23 24 32.23	1.8787	7 22 4.8	9.760	10	0 54 5.25	1.8732	0 50 10.2	10.537
11	23 26 24.91	1.8774	7 12 18.3	9.790	11	0 55 57.67	1.8743	1 0 42.5	10.539
12	23 28 17.52	1.8762	7 2 30.0	9.819	12	0 57 50.17	1.8757	1 11 14.9	10.541
13	23 30 10.05	1.8748	6 52 40.0	9.847	13	0 59 42.75	1.8770	1 21 47.4	10.542
14	23 32 2.49	1.8735	6 42 48.4	9.873	14	1 1 35.41	1.8783	1 32 19.9	10.542
15	23 33 54.87	1.8723	6 32 55.2	9.900	15	1 3 28.15	1.8797	1 42 52.4	10.541
16	23 35 47.18	1.8713	6 23 0.4	9.927	16	1 5 20.98	1.8812	1 53 24.8	10.540
17	23 37 39.43	1.8703	6 13 4.0	9.953	17	1 7 13.90	1.8827	2 3 57.2	10.539
18	23 39 31.62	1.8692	6 3 6.0	9.978	18	1 9 6.91	1.8843	2 14 29.5	10.537
19	23 41 23.74	1.8682	5 53 6.6	10.002	19	1 11 0.02	1.8860	2 25 1.7	10.535
20	23 43 15.81	1.8674	5 43 5.7	10.027	20	1 12 53.23	1.8877	2 35 33.7	10.532
21	23 45 7.83	1.8664	5 33 3.4	10.050	21	1 14 46.54	1.8894	2 46 5.5	10.527
22	23 46 59.81	1.8650	5 22 59.7	10.073	22	1 16 39.96	1.8912	2 56 37.0	10.522
23	23 48 51.74	1.8631	5 12 54.6	10.097	23	1 18 33.49	1.8931	3 7 8.2	10.517
24	23 50 43.62	1.8613	S. 5° 2' 48.1"	10.119	24	1 20 27.13	1.8949	N. 3° 17' 39.0"	10.511

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 5.					MONDAY 7.				
0	1 20 27.13	1.8949	N. 3 17 39.0	10.511	0	2 54 34.70	2.0451	N. 11 21 53.2	9.365
1	1 22 20.88	1.8969	3 28 9.5	10.505	1	2 56 37.53	2.0492	11 31 13.8	9.322
2	1 24 14.76	1.8990	3 38 39.6	10.498	2	2 58 40.60	2.0533	11 40 31.8	9.277
3	1 26 8.76	1.9010	3 49 9.2	10.490	3	3 0 43.93	2.0577	11 49 47.0	9.230
4	1 28 2.88	1.9032	3 59 38.4	10.482	4	3 2 47.52	2.0620	11 58 59.4	9.182
5	1 29 57.14	1.9054	4 10 7.0	10.472	5	3 4 51.37	2.0663	12 8 8.9	9.134
6	1 31 51.53	1.9076	4 20 35.0	10.462	6	3 6 55.48	2.0707	12 17 15.5	9.086
7	1 33 46.05	1.9098	4 31 2.4	10.451	7	3 8 59.85	2.0750	12 26 19.2	9.037
8	1 35 40.71	1.9122	4 41 29.1	10.440	8	3 11 4.48	2.0794	12 35 19.9	8.987
9	1 37 35.51	1.9146	4 51 55.2	10.429	9	3 13 9.38	2.0839	12 44 17.6	8.935
10	1 39 30.46	1.9170	5 2 20.6	10.417	10	3 15 14.55	2.0883	12 53 12.1	8.881
11	1 41 25.55	1.9193	5 12 45.2	10.403	11	3 17 19.98	2.0929	13 2 3.3	8.827
12	1 43 20.79	1.9220	5 23 9.0	10.389	12	3 19 25.69	2.0974	13 10 51.3	8.772
13	1 45 16.19	1.9247	5 33 31.9	10.373	13	3 21 31.67	2.1020	13 19 36.0	8.717
14	1 47 11.75	1.9272	5 43 53.8	10.357	14	3 23 37.93	2.1066	13 28 17.4	8.661
15	1 49 7.46	1.9299	5 54 14.8	10.342	15	3 25 44.46	2.1112	13 36 55.3	8.602
16	1 51 3.34	1.9327	6 4 34.9	10.326	16	3 27 51.27	2.1158	13 45 29.7	8.545
17	1 52 59.39	1.9355	6 14 53.9	10.308	17	3 29 58.35	2.1203	13 54 0.7	8.484
18	1 54 55.60	1.9383	6 25 11.8	10.289	18	3 32 5.71	2.1250	14 2 28.0	8.425
19	1 56 51.99	1.9412	6 35 28.6	10.270	19	3 34 13.35	2.1297	14 10 51.7	8.363
20	1 58 48.55	1.9442	6 45 44.2	10.250	20	3 36 21.28	2.1345	14 19 11.6	8.300
21	2 0 45.29	1.9472	6 55 58.6	10.229	21	3 38 29.49	2.1392	14 27 27.7	8.237
22	2 2 42.21	1.9502	7 6 11.7	10.208	22	3 40 37.98	2.1438	14 35 40.0	8.172
23	2 4 39.31	1.9532	N. 7 16 23.5	10.186	23	3 42 46.75	2.1486	N. 14 43 48.4	8.127
SUNDAY 6.					TUESDAY 8.				
0	2 6 36.60	1.9564	N. 7 26 34.0	10.163	0	3 44 55.82	2.1535	N. 14 51 52.8	8.040
1	2 8 34.08	1.9596	7 36 43.1	10.139	1	3 47 5.17	2.1582	14 59 53.2	7.972
2	2 10 31.75	1.9628	7 46 50.7	10.114	2	3 49 14.80	2.1629	15 7 49.5	7.902
3	2 12 29.62	1.9662	7 56 56.8	10.090	3	3 51 24.72	2.1678	15 15 41.7	7.833
4	2 14 27.69	1.9694	8 7 1.5	10.064	4	3 53 34.93	2.1726	15 23 29.7	7.764
5	2 16 25.95	1.9727	8 17 4.5	10.037	5	3 55 45.43	2.1774	15 31 13.4	7.692
6	2 18 24.42	1.9762	8 27 5.9	10.009	6	3 57 56.22	2.1822	15 38 52.7	7.618
7	2 20 23.10	1.9798	8 37 5.6	9.981	7	4 0 7.30	2.1870	15 46 27.6	7.545
8	2 22 21.99	1.9832	8 47 3.6	9.952	8	4 2 18.66	2.1918	15 53 58.1	7.472
9	2 24 21.08	1.9867	8 56 59.8	9.920	9	4 4 30.32	2.1968	16 1 24.2	7.398
10	2 26 20.39	1.9903	9 6 54.0	9.888	10	4 6 42.27	2.2016	16 8 45.6	7.317
11	2 28 19.92	1.9940	9 16 46.4	9.857	11	4 8 54.51	2.2063	16 16 2.3	7.240
12	2 30 19.67	1.9977	9 26 36.9	9.825	12	4 11 7.03	2.2112	16 23 14.4	7.161
13	2 32 19.64	2.0014	9 36 25.4	9.792	13	4 13 19.85	2.2161	16 30 21.7	7.082
14	2 34 19.83	2.0052	9 46 11.9	9.757	14	4 15 32.96	2.2209	16 37 24.2	7.001
15	2 36 20.26	2.0089	9 55 56.3	9.722	15	4 17 46.36	2.2257	16 44 21.8	6.918
16	2 38 20.91	2.0128	10 5 38.6	9.686	16	4 20 0.04	2.2303	16 51 14.4	6.835
17	2 40 21.80	2.0167	10 15 18.7	9.649	17	4 22 14.00	2.2352	16 58 2.0	6.752
18	2 42 22.92	2.0207	10 24 56.5	9.611	18	4 24 28.26	2.2401	17 4 44.6	6.667
19	2 44 24.28	2.0247	10 34 32.0	9.572	19	4 26 42.81	2.2448	17 11 22.0	6.580
20	2 46 25.88	2.0286	10 44 5.2	9.532	20	4 28 57.64	2.2496	17 17 54.2	6.493
21	2 48 27.71	2.0326	10 53 35.9	9.492	21	4 31 12.76	2.2543	17 24 21.2	6.405
22	2 50 29.79	2.0367	11 3 4.2	9.451	22	4 33 28.16	2.2590	17 30 42.8	6.316
23	2 52 32.12	2.0409	11 12 29.9	9.408	23	4 35 43.84	2.2638	17 36 59.1	6.226
24	2 54 34.70	2.0451	N. 11 21 53.2	9.365	24	4 37 59.81	2.2685	N. 17 43 9.9	6.134

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 9.					FRIDAY 11.				
0	h m s	s	N.17° 43' 9.9"	6.134	0	h m s	s	N.20° 35' 26.5"	0.748
1	4 37 59.81	2.9685	17 49 15.2	6.042	1	6 31 34.24	2.4422	20 36 7.6	0.622
2	4 40 16.06	2.9732	17 55 15.0	5.950	2	6 34 0.83	2.4442	20 36 41.1	0.494
3	4 42 32.59	2.9778	18 1 9.2	5.856	3	6 36 27.54	2.4461	20 37 6.9	0.365
4	4 44 49.40	2.9825	18 6 57.7	5.760	4	6 38 54.36	2.4473	20 37 24.9	0.236
5	4 47 6.49	2.9871	18 12 40.4	5.664	5	6 41 21.29	2.4497	20 37 35.2	0.107
6	4 49 23.85	2.9916	18 18 17.4	5.567	6	6 43 48.32	2.4513	20 37 37.7	0.023
7	4 51 41.48	2.9962	18 23 48.5	5.469	7	6 46 15.45	2.4529	20 37 32.4	0.159
8	4 53 59.39	2.3008	18 29 13.7	5.370	8	6 48 42.67	2.4543	20 37 19.4	0.282
9	4 56 17.57	2.3053	18 34 32.9	5.270	9	6 51 9.97	2.4558	20 36 58.5	0.413
10	4 58 36.02	2.3097	18 39 46.1	5.169	10	6 53 37.36	2.4572	20 36 29.8	0.542
11	5 0 54.73	2.3141	18 44 53.2	5.067	11	6 56 4.83	2.4583	20 35 53.3	0.673
12	5 3 13.71	2.3185	18 49 54.2	4.965	12	6 58 32.36	2.4594	20 35 9.0	0.803
13	5 5 32.95	2.3228	18 54 49.0	4.861	13	7 0 59.96	2.4604	20 34 16.9	0.934
14	5 7 52.45	2.3271	18 59 37.5	4.757	14	7 3 27.61	2.4616	20 33 16.9	1.065
15	5 10 12.20	2.3313	19 4 19.8	4.652	15	7 5 55.33	2.4624	20 32 9.1	1.195
16	5 12 32.21	2.3357	19 8 55.7	4.544	16	7 8 23.10	2.4632	20 30 53.5	1.326
17	5 14 52.48	2.3399	19 13 25.1	4.437	17	7 10 50.92	2.4639	20 29 30.0	1.457
18	5 17 13.00	2.3440	19 17 48.2	4.331	18	7 13 18.77	2.4644	20 27 58.6	1.588
19	5 19 33.76	2.3481	19 22 4.8	4.221	19	7 15 46.65	2.4649	20 26 19.4	1.719
20	5 21 54.77	2.3522	19 26 14.7	4.110	20	7 18 14.56	2.4654	20 24 32.3	1.850
21	5 24 16.02	2.3561	19 30 18.0	4.000	21	7 20 42.50	2.4658	20 22 37.4	1.981
22	5 26 37.50	2.3600	19 34 14.7	3.889	22	7 23 10.46	2.4661	20 20 34.6	2.112
23	5 28 59.22	2.3639	N.19 38 4.7	3.777	23	7 25 38.43	2.4663	N.20 18 24.0	2.242
24	5 31 21.17	2.3678				7 28 6.42	2.4664		
THURSDAY 10.					SATURDAY 12.				
0	5 33 43.35	2.3716	19 45 24.3	3.663	0	7 30 34.40	2.4663	N.20 16 5.6	2.372
1	5 36 5.76	2.3753	19 48 53.8	3.549	1	7 33 2.38	2.4663	20 13 39.4	2.502
2	5 38 28.39	2.3789	19 52 16.4	3.434	2	7 35 30.96	2.4662	20 11 5.3	2.632
3	5 40 51.23	2.3824	19 55 32.1	3.304	3	7 37 58.33	2.4661	20 8 23.5	2.762
4	5 43 14.28	2.3860	19 58 40.9	3.087	4	7 40 26.29	2.4657	20 5 33.9	2.892
5	5 45 37.55	2.3896	20 1 42.6	2.851	5	7 42 54.21	2.4652	20 2 36.5	3.021
6	5 48 1.03	2.3930	20 4 37.2	2.732	6	7 45 22.11	2.4647	19 59 31.4	3.149
7	5 50 24.71	2.3963	20 7 24.7	2.612	7	7 47 49.98	2.4642	19 56 18.6	3.277
8	5 52 48.59	2.3996	20 10 5.0	2.492	8	7 50 17.82	2.4636	19 52 58.1	3.406
9	5 55 12.66	2.4028	20 12 38.1	2.371	9	7 52 45.61	2.4628	19 49 29.8	3.535
10	5 57 36.92	2.4059	20 15 4.0	2.250	10	7 55 13.36	2.4621	19 45 53.8	3.663
11	6 0 1.37	2.4091	20 17 22.6	2.127	11	7 57 41.06	2.4612	19 42 10.2	3.790
12	6 2 26.01	2.4122	20 19 34.0	2.004	12	8 0 8.71	2.4603	19 38 19.0	3.917
13	6 4 50.83	2.4150	20 21 37.9	1.882	13	8 2 36.30	2.4593	19 34 20.2	4.043
14	6 7 15.81	2.4178	20 23 34.5	1.757	14	8 5 3.82	2.4582	19 30 13.8	4.169
15	6 9 40.97	2.4206	20 25 23.7	1.632	15	8 7 31.28	2.4571	19 25 59.9	4.295
16	6 12 6.30	2.4233	20 27 5.4	1.508	16	8 9 58.67	2.4558	19 21 38.4	4.421
17	6 14 31.78	2.4259	20 28 39.6	1.383	17	8 12 25.98	2.4545	19 17 9.4	4.545
18	6 16 57.41	2.4285	20 30 6.4	1.257	18	8 14 53.21	2.4532	19 12 33.0	4.669
19	6 19 23.20	2.4310	20 31 25.6	1.131	19	8 17 20.36	2.4518	19 7 49.1	4.793
20	6 21 49.14	2.4334	20 32 37.3	1.004	20	8 19 47.42	2.4502	19 2 57.8	4.916
21	6 24 15.21	2.4357	20 33 41.4	0.876	21	8 22 14.39	2.4487	18 57 59.2	5.038
22	6 26 41.42	2.4380	N.20 35 26.5	0.748	22	8 24 41.26	2.4470	18 52 53.3	5.160
23	6 29 7.77	2.4402			23	8 27 8.03	2.4453	18 47 40.0	5.282
24	6 31 34.24	2.4422			24	8 29 34.70	2.4437	N.18 42 19.5	5.402

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 13.					TUESDAY 15.				
0	8 <sup>h</sup> 29 <sup>m</sup> 34.70	2.4437	N. 18° 42' 19.5"	5.409	0	10 <sup>h</sup> 24 <sup>m</sup> 4.37	2.3187	N. 12° 19' 48.1"	10.162
1	8 32 1.27	2.4418	18 36 51.7	5.522	1	10 26 23.40	2.3158	12 9 36.2	10.235
2	8 34 27.72	2.4398	18 31 16.8	5.641	2	10 28 42.27	2.3130	11 59 19.9	10.307
3	8 36 54.05	2.4379	18 25 34.8	5.759	3	10 31 0.96	2.3102	11 48 59.3	10.378
4	8 39 20.27	2.4360	18 19 45.7	5.877	4	10 33 19.49	2.3074	11 38 34.6	10.448
5	8 41 46.37	2.4340	18 13 49.5	5.995	5	10 35 37.85	2.3047	11 28 5.6	10.516
6	8 44 12.35	2.4320	18 7 46.3	6.112	6	10 37 56.05	2.3019	11 17 32.6	10.584
7	8 46 38.21	2.4299	18 1 36.1	6.227	7	10 40 14.08	2.2992	11 6 55.5	10.651
8	8 49 3.93	2.4276	17 55 19.0	6.342	8	10 42 31.95	2.2964	10 56 14.5	10.716
9	8 51 29.52	2.4253	17 48 55.1	6.456	9	10 44 49.65	2.2937	10 45 29.6	10.780
10	8 53 54.97	2.4231	17 42 24.3	6.569	10	10 47 7.20	2.2912	10 34 40.9	10.842
11	8 56 20.29	2.4208	17 35 46.8	6.682	11	10 49 24.59	2.2885	10 23 48.5	10.906
12	8 58 45.47	2.4184	17 29 2.5	6.794	12	10 51 41.82	2.2859	10 12 52.4	10.965
13	9 1 10.50	2.4160	17 22 11.5	6.905	13	10 53 58.90	2.2833	10 1 52.7	11.024
14	9 3 35.39	2.4137	17 15 13.9	7.014	14	10 56 15.82	2.2808	9 50 49.5	11.082
15	9 6 0.14	2.4112	17 8 9.8	7.122	15	10 58 32.59	2.2782	9 39 42.9	11.139
16	9 8 24.73	2.4086	17 0 59.2	7.231	16	11 0 49.21	2.2758	9 28 32.9	11.194
17	9 10 49.17	2.4060	16 53 42.1	7.339	17	11 3 5.69	2.2734	9 17 19.6	11.248
18	9 13 13.45	2.4034	16 46 18.5	7.446	18	11 5 22.02	2.2709	9 6 3.1	11.302
19	9 15 37.58	2.4008	16 38 48.6	7.551	19	11 7 38.20	2.2685	8 54 43.4	11.354
20	9 18 1.55	2.3979	16 31 12.4	7.655	20	11 9 54.24	2.2663	8 43 20.6	11.405
21	9 20 25.37	2.3956	16 23 30.0	7.759	21	11 12 10.14	2.2639	8 31 54.8	11.453
22	9 22 49.02	2.3928	16 15 41.4	7.861	22	11 14 25.91	2.2617	8 20 26.2	11.502
23	9 25 12.51	2.3901	N. 16° 7' 46.7"	7.963	23	11 16 41.54	2.2593	N. 8° 8' 54.6"	11.550
MONDAY 14.					WEDNESDAY 16.				
0	9 27 35.83	2.3873	N. 15° 59' 45.8"	8.064	0	11 18 57.03	2.2571	N. 7° 57' 20.2"	11.596
1	9 29 58.99	2.3846	15 51 39.0	8.163	1	11 21 12.39	2.2549	7 45 43.1	11.641
2	9 32 21.98	2.3818	15 43 26.2	8.262	2	11 23 27.62	2.2527	7 34 3.3	11.684
3	9 34 44.80	2.3790	15 35 7.6	8.359	3	11 25 42.72	2.2507	7 22 21.0	11.726
4	9 37 7.46	2.3762	15 26 43.1	8.457	4	11 27 57.70	2.2487	7 10 36.2	11.767
5	9 39 29.95	2.3734	15 18 12.8	8.554	5	11 30 12.56	2.2467	6 58 49.0	11.807
6	9 41 52.27	2.3705	15 9 36.8	8.647	6	11 32 27.30	2.2447	6 46 59.4	11.846
7	9 44 14.41	2.3677	15 0 55.2	8.739	7	11 34 41.92	2.2428	6 35 7.5	11.883
8	9 46 36.39	2.3648	14 52 8.1	8.831	8	11 36 56.43	2.2408	6 23 13.4	11.919
9	9 48 58.19	2.3618	14 43 15.5	8.922	9	11 39 10.82	2.2390	6 11 17.2	11.952
10	9 51 19.82	2.3591	14 34 17.4	9.013	10	11 41 25.11	2.2372	5 59 18.9	11.988
11	9 53 41.28	2.3562	14 25 13.8	9.103	11	11 43 39.29	2.2354	5 47 18.6	12.022
12	9 56 2.56	2.3532	14 16 5.0	9.192	12	11 45 53.36	2.2337	5 35 16.3	12.053
13	9 58 23.67	2.3503	14 6 50.9	9.278	13	11 48 7.33	2.2321	5 23 12.2	12.082
14	10 0 44.60	2.3474	13 57 31.6	9.364	14	11 50 21.21	2.2305	5 11 6.4	12.111
15	10 3 5.36	2.3445	13 48 7.2	9.448	15	11 52 34.99	2.2288	4 58 58.9	12.139
16	10 5 25.94	2.3416	13 38 37.8	9.532	16	11 54 48.67	2.2272	4 46 49.7	12.168
17	10 7 46.35	2.3388	13 29 3.4	9.615	17	11 57 2.26	2.2258	4 34 39.0	12.191
18	10 10 6.59	2.3358	13 19 24.0	9.697	18	11 59 15.76	2.2243	4 22 26.8	12.215
19	10 12 26.65	2.3329	13 9 39.7	9.777	19	12 1 29.18	2.2230	4 10 13.2	12.238
20	10 14 46.54	2.3300	12 59 50.7	9.856	20	12 3 42.52	2.2217	3 57 58.2	12.260
21	10 17 6.25	2.3271	12 49 57.0	9.934	21	12 5 55.78	2.2203	3 45 42.0	12.280
22	10 19 25.79	2.3242	12 39 58.6	10.012	22	12 8 8.96	2.2191	3 33 24.6	12.299
23	10 21 45.16	2.3215	12 29 55.6	10.087	23	12 10 22.07	2.2178	3 21 6.1	12.318
24	10 24 4.37	2.3187	N. 12° 19' 48.1"	10.162	24	12 12 35.10	2.2167	N. 3° 8' 46.5"	12.334

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 17.					SATURDAY 19.				
0	12 12 35.10	2.2167	N. 3 8 46.5	12.334	0	13 58 35.66	2.2186	S. 6 39 57.8	11.742
1	12 14 48.07	2.2156	2 56 26.0	12.350	1	14 0 48.81	2.2198	6 51 41.1	11.701
2	12 17 0.97	2.2145	2 44 4.5	12.365	2	14 3 2.03	2.2208	7 3 21.9	11.658
3	12 19 13.81	2.2135	2 31 42.2	12.378	3	14 5 15.31	2.2220	7 15 0.1	11.615
4	12 21 26.59	2.2126	2 19 19.2	12.389	4	14 7 28.67	2.2233	7 26 35.7	11.572
5	12 23 39.32	2.2117	2 6 55.5	12.400	5	14 9 42.11	2.2246	7 38 8.7	11.527
6	12 25 52.00	2.2109	1 54 31.2	12.410	6	14 11 55.62	2.2258	7 49 38.9	11.479
7	12 28 4.63	2.2101	1 42 6.3	12.419	7	14 14 9.21	2.2272	8 1 6.2	11.431
8	12 30 17.21	2.2092	1 29 41.0	12.426	8	14 16 22.89	2.2287	8 12 30.6	11.382
9	12 32 29.74	2.2085	1 17 15.2	12.433	9	14 18 36.65	2.2300	8 23 52.0	11.332
10	12 34 42.23	2.2078	1 4 49.0	12.437	10	14 20 50.49	2.2314	8 35 10.4	11.281
11	12 36 54.68	2.2073	0 52 22.7	12.439	11	14 23 4.42	2.2329	8 46 25.7	11.228
12	12 39 7.11	2.2068	0 39 56.3	12.442	12	14 25 18.44	2.2344	8 57 37.8	11.175
13	12 41 19.50	2.2062	0 27 29.7	12.444	13	14 27 32.55	2.2359	9 8 46.7	11.121
14	12 43 31.86	2.2058	0 15 3.0	12.444	14	14 29 46.75	2.2375	9 19 52.3	11.064
15	12 45 44.19	2.2052	N. 0 2 36.4	12.442	15	14 32 1.05	2.2391	9 30 54.4	11.007
16	12 47 56.50	2.2049	S. 0 9 50.1	12.440	16	14 34 15.44	2.2406	9 41 53.1	10.950
17	12 50 8.78	2.2048	0 22 16.4	12.437	17	14 36 29.92	2.2422	9 52 48.4	10.892
18	12 52 21.06	2.2045	0 34 42.5	12.432	18	14 38 44.50	2.2439	10 3 40.1	10.831
19	12 54 33.32	2.2042	0 47 8.3	12.427	19	14 40 59.19	2.2457	10 14 28.1	10.770
20	12 56 45.57	2.2041	0 59 33.7	12.419	20	14 43 13.98	2.2472	10 25 12.5	10.708
21	12 58 57.81	2.2039	1 11 58.6	12.411	21	14 45 28.86	2.2489	10 35 53.1	10.644
22	13 1 10.04	2.2038	1 24 23.0	12.402	22	14 47 43.85	2.2507	10 46 29.8	10.579
23	13 3 22.27	2.2039	S. 1 36 46.8	12.391	23	14 49 58.94	2.2523	S. 10 57 2.6	10.514
FRIDAY 18.					SUNDAY 20.				
0	13 5 34.51	2.2040	S. 1 49 9.9	12.378	0	14 52 14.13	2.2542	S. 11 7 31.5	10.448
1	13 7 46.75	2.2040	2 1 32.2	12.366	1	14 54 29.44	2.2560	11 17 56.4	10.380
2	13 9 58.99	2.2041	2 13 53.8	12.352	2	14 56 44.85	2.2578	11 28 17.1	10.311
3	13 12 11.24	2.2043	2 26 14.5	12.337	3	14 59 0.36	2.2596	11 38 33.7	10.242
4	13 14 23.51	2.2046	2 38 34.2	12.320	4	15 1 16.00	2.2614	11 48 46.1	10.172
5	13 16 35.79	2.2048	2 50 52.9	12.302	5	15 3 31.74	2.2632	11 58 54.3	10.100
6	13 18 48.09	2.2052	3 3 10.4	12.282	6	15 5 47.58	2.2650	12 8 58.1	10.027
7	13 21 0.41	2.2056	3 15 26.8	12.263	7	15 8 3.54	2.2669	12 18 57.5	9.952
8	13 23 12.76	2.2060	3 27 42.0	12.242	8	15 10 19.61	2.2688	12 28 52.4	9.877
9	13 25 25.13	2.2065	3 39 55.8	12.218	9	15 12 35.79	2.2707	12 38 42.8	9.802
10	13 27 37.54	2.2070	3 52 8.2	12.195	10	15 14 52.09	2.2725	12 48 28.6	9.725
11	13 29 49.97	2.2074	4 4 19.2	12.170	11	15 17 8.49	2.2743	12 58 9.8	9.647
12	13 32 2.43	2.2080	4 16 28.6	12.143	12	15 19 25.01	2.2762	13 7 46.3	9.569
13	13 34 14.93	2.2087	4 28 36.4	12.117	13	15 21 41.64	2.2782	13 17 18.1	9.489
14	13 36 27.47	2.2094	4 40 42.6	12.089	14	15 23 58.39	2.2801	13 26 45.0	9.407
15	13 38 40.06	2.2102	4 52 47.1	12.060	15	15 26 15.25	2.2819	13 36 7.0	9.326
16	13 40 52.69	2.2109	5 4 49.8	12.029	16	15 28 32.22	2.2838	13 45 24.1	9.243
17	13 43 5.37	2.2118	5 16 50.6	11.997	17	15 30 49.30	2.2856	13 54 36.2	9.160
18	13 45 18.10	2.2127	5 28 49.4	11.963	18	15 33 6.49	2.2875	14 3 43.3	9.075
19	13 47 30.89	2.2135	5 40 46.2	11.930	19	15 35 23.80	2.2893	14 12 45.2	8.989
20	13 49 43.72	2.2143	5 52 41.0	11.895	20	15 37 41.21	2.2912	14 21 42.0	8.903
21	13 51 56.61	2.2153	6 4 33.6	11.858	21	15 39 58.74	2.2931	14 30 33.6	8.817
22	13 54 9.56	2.2164	6 16 24.0	11.821	22	15 42 16.38	2.2949	14 39 20.0	8.732
23	13 56 22.58	2.2175	6 28 12.1	11.782	23	15 44 34.13	2.2968	14 48 1.0	8.638
24	13 58 35.66	2.2186	S. 6 39 57.8	11.742	24	15 46 51.99	2.2986	S. 14 56 36.6	8.546

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 21.					WEDNESDAY 23.				
0	15 46 51.99	2.2986	S. 14 56 36.6	8.548	0	17 38 46.21	2.3479	S. 19 49 5.6	3.490
1	15 49 9.96	2.3003	15 5 6.8	8.457	1	17 41 7.08	2.3477	19 52 27.3	3.302
2	15 51 28.03	2.3022	15 13 31.5	8.365	2	17 43 27.93	2.3474	19 55 41.9	3.184
3	15 53 46.22	2.3040	15 21 50.6	8.273	3	17 45 48.77	2.3472	19 58 49.4	3.066
4	15 56 4.51	2.3058	15 30 4.2	8.179	4	17 48 9.59	2.3467	20 1 49.8	2.947
5	15 58 22.91	2.3075	15 38 12.1	8.085	5	17 50 30.37	2.3462	20 4 43.1	2.830
6	16 0 41.41	2.3092	15 46 14.4	7.990	6	17 52 51.13	2.3457	20 7 29.4	2.719
7	16 3 0.01	2.3108	15 54 10.9	7.893	7	17 55 11.86	2.3452	20 10 8.6	2.594
8	16 5 18.72	2.3126	16 2 1.6	7.797	8	17 57 32.55	2.3445	20 12 40.7	2.476
9	16 7 37.52	2.3143	16 9 46.5	7.700	9	17 59 53.20	2.3438	20 15 5.7	2.357
10	16 9 56.43	2.3159	16 17 25.6	7.602	10	18 2 13.81	2.3430	20 17 23.6	2.239
11	16 12 15.43	2.3174	16 24 58.7	7.502	11	18 4 34.36	2.3421	20 19 34.3	2.119
12	16 14 34.52	2.3190	16 32 25.8	7.402	12	18 6 54.86	2.3412	20 21 37.9	2.001
13	16 16 53.71	2.3206	16 39 46.9	7.301	13	18 9 15.31	2.3403	20 23 34.4	1.883
14	16 19 12.99	2.3221	16 47 1.9	7.200	14	18 11 35.69	2.3392	20 25 23.9	1.765
15	16 21 32.36	2.3236	16 54 10.9	7.099	15	18 13 56.02	2.3382	20 27 6.3	1.647
16	16 23 51.82	2.3251	17 1 13.8	6.995	16	18 16 16.28	2.3370	20 28 41.5	1.528
17	16 26 11.37	2.3265	17 8 10.3	6.890	17	18 18 36.46	2.3358	20 30 9.7	1.410
18	16 28 31.00	2.3278	17 15 0.6	6.787	18	18 20 56.57	2.3345	20 31 30.7	1.292
19	16 30 50.71	2.3292	17 21 44.7	6.682	19	18 23 16.60	2.3331	20 32 44.7	1.174
20	16 33 10.50	2.3305	17 28 22.5	6.577	20	18 25 36.54	2.3316	20 33 51.6	1.057
21	16 35 30.37	2.3318	17 34 54.0	6.470	21	18 27 56.39	2.3301	20 34 51.5	0.939
22	16 37 50.32	2.3331	17 41 18.9	6.363	22	18 30 16.15	2.3286	20 35 44.3	0.822
23	16 40 10.34	2.3343	S. 17 47 37.5	6.257	23	18 32 35.82	2.3269	S. 20 36 30.1	0.704
TUESDAY 22.					THURSDAY 24.				
0	16 42 30.43	2.3354	S. 17 53 49.7	6.149	0	18 34 55.38	2.3252	S. 20 37 8.8	0.587
1	16 44 50.59	2.3366	17 59 55.4	6.040	1	18 37 14.84	2.3234	20 37 40.5	0.471
2	16 47 10.82	2.3376	18 5 54.5	5.930	2	18 39 34.19	2.3216	20 38 5.3	0.354
3	16 49 31.10	2.3385	18 11 47.0	5.820	3	18 41 53.43	2.3198	20 38 23.0	0.237
4	16 51 51.44	2.3395	18 17 32.4	5.711	4	18 44 12.56	2.3178	20 38 33.8	0.122
5	16 54 11.84	2.3405	18 23 12.3	5.601	5	18 46 31.57	2.3158	20 38 37.6	0.006
6	16 56 32.30	2.3414	18 28 45.0	5.489	6	18 48 50.45	2.3137	20 38 34.5	0.109
7	16 58 52.81	2.3422	18 34 11.0	5.377	7	18 51 9.21	2.3115	20 38 24.5	0.224
8	17 1 13.37	2.3430	18 39 30.3	5.265	8	18 53 27.83	2.3093	20 38 7.6	0.339
9	17 3 33.97	2.3438	18 44 42.8	5.152	9	18 55 46.33	2.3071	20 37 43.8	0.453
10	17 5 54.62	2.3444	18 49 48.5	5.039	10	18 58 4.69	2.3048	20 37 13.2	0.567
11	17 8 15.30	2.3449	18 54 47.5	4.927	11	19 0 22.91	2.3025	20 36 35.7	0.682
12	17 10 36.01	2.3455	18 59 39.7	4.812	12	19 2 40.99	2.3001	20 35 51.4	0.794
13	17 12 56.76	2.3461	19 4 25.0	4.697	13	19 4 58.92	2.2975	20 35 0.4	0.907
14	17 15 17.54	2.3466	19 9 3.4	4.583	14	19 7 16.69	2.2950	20 34 2.6	1.020
15	17 17 38.35	2.3470	19 13 35.0	4.468	15	19 9 34.32	2.2925	20 32 58.0	1.132
16	17 19 59.18	2.3473	19 17 59.6	4.352	16	19 11 51.79	2.2898	20 31 46.7	1.243
17	17 22 20.03	2.3476	19 22 17.3	4.237	17	19 14 9.10	2.2871	20 30 28.8	1.354
18	17 24 40.90	2.3478	19 26 28.0	4.121	18	19 16 26.24	2.2843	20 29 4.2	1.465
19	17 27 1.78	2.3480	19 30 31.8	4.004	19	19 18 43.22	2.2816	20 27 33.0	1.575
20	17 29 22.66	2.3481	19 34 28.5	3.887	20	19 21 0.03	2.2787	20 25 55.2	1.685
21	17 31 43.55	2.3482	19 38 18.3	3.772	21	19 23 16.66	2.2757	20 24 10.8	1.794
22	17 34 4.44	2.3482	19 42 1.1	3.655	22	19 25 33.11	2.2727	20 22 19.9	1.902
23	17 36 25.33	2.3481	19 45 36.9	3.537	23	19 27 49.39	2.2698	20 20 22.5	2.010
24	17 38 46.21	2.3479	S. 19 49 5.6	3.420	24	19 30 5.49	2.2668	S. 20 18 18.6	2.119

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 25.					SUNDAY 27.				
0	19 30 5.49	2.9668	S. 20° 18' 18.6"	2.119	0	21 14 44.45	2.0865	S. 16° 44' 59.2"	6.495
1	19 32 21.40	2.9637	20 16 8.3	2.925	1	21 16 49.52	2.0825	16 38 27.3	6.568
2	19 34 37.13	2.9605	20 13 51.6	2.339	2	21 18 54.36	2.0786	16 31 51.0	6.642
3	19 36 52.66	2.9572	20 11 28.5	2.442	3	21 20 58.95	2.0746	16 25 10.3	6.713
4	19 39 8.00	2.9540	20 8 59.0	2.543	4	21 23 3.31	2.0707	16 18 25.4	6.789
5	19 41 23.14	2.9507	20 6 23.3	2.647	5	21 25 7.43	2.0668	16 11 36.4	6.854
6	19 43 38.09	2.9475	20 3 41.4	2.751	6	21 27 11.32	2.0628	16 4 43.1	6.922
7	19 45 52.84	2.9442	20 0 53.2	2.855	7	21 29 14.97	2.0589	15 57 45.7	6.991
8	19 48 7.39	2.9407	19 57 58.8	2.959	8	21 31 18.39	2.0551	15 50 44.2	7.059
9	19 50 21.72	2.9371	19 54 58.2	3.060	9	21 33 21.58	2.0512	15 43 38.6	7.127
10	19 52 35.84	2.9337	19 51 51.6	3.161	10	21 35 24.53	2.0472	15 36 29.0	7.199
11	19 54 49.76	2.9303	19 48 38.9	3.262	11	21 37 27.25	2.0434	15 29 15.6	7.267
12	19 57 3.48	2.9268	19 45 20.1	3.363	12	21 39 29.74	2.0397	15 21 58.2	7.332
13	19 59 16.98	2.9232	19 41 55.3	3.469	13	21 41 32.01	2.0358	15 14 36.9	7.398
14	20 1 30.26	2.9195	19 38 24.6	3.562	14	21 43 34.04	2.0320	15 7 11.9	7.449
15	20 3 43.32	2.9159	19 34 47.9	3.660	15	21 45 35.85	2.0283	14 59 43.0	7.512
16	20 5 56.17	2.9122	19 31 5.4	3.757	16	21 47 37.44	2.0246	14 52 10.5	7.574
17	20 8 8.79	2.9085	19 27 17.0	3.855	17	21 49 38.80	2.0208	14 44 34.3	7.634
18	20 10 21.19	2.9048	19 23 22.8	3.951	18	21 51 39.94	2.0172	14 36 54.4	7.695
19	20 12 33.37	2.9011	19 19 22.9	4.046	19	21 53 40.87	2.0136	14 29 10.9	7.754
20	20 14 45.32	2.1972	19 15 17.3	4.141	20	21 55 41.57	2.0098	14 21 23.9	7.812
21	20 16 57.04	2.1934	19 11 6.0	4.235	21	21 57 42.05	2.0062	14 13 33.4	7.871
22	20 19 8.53	2.1896	19 6 49.1	4.329	22	21 59 42.32	2.0027	14 5 39.4	7.928
23	20 21 19.80	2.1858	S. 19 2 26.6	4.422	23	22 1 42.38	1.9992	S. 13 57 42.0	7.984
SATURDAY 26.					MONDAY 28.				
0	20 23 30.83	2.1821	S. 18 57 58.5	4.513	0	22 3 42.23	1.9957	S. 13 49 41.3	8.040
1	20 25 41.64	2.1782	18 53 25.0	4.604	1	22 5 41.87	1.9922	13 41 37.2	8.094
2	20 27 52.21	2.1742	18 48 46.0	4.695	2	22 7 41.30	1.9888	13 33 20.9	8.149
3	20 30 2.54	2.1702	18 44 1.6	4.785	3	22 9 40.52	1.9853	13 25 19.3	8.204
4	20 32 12.64	2.1663	18 39 11.8	4.875	4	22 11 39.54	1.9819	13 17 5.4	8.257
5	20 34 22.50	2.1624	18 34 16.6	4.963	5	22 13 38.35	1.9786	13 8 48.4	8.309
6	20 36 32.13	2.1585	18 29 16.2	5.050	6	22 15 36.97	1.9752	13 0 28.3	8.360
7	20 38 41.52	2.1545	18 24 10.6	5.137	7	22 17 35.38	1.9719	12 52 5.2	8.411
8	20 40 50.67	2.1505	18 18 59.8	5.222	8	22 19 33.60	1.9687	12 43 39.0	8.462
9	20 42 59.58	2.1465	18 13 43.9	5.307	9	22 21 31.62	1.9654	12 35 9.8	8.511
10	20 45 8.25	2.1426	18 8 22.9	5.392	10	22 23 29.45	1.9622	12 26 37.7	8.559
11	20 47 16.69	2.1387	18 2 56.8	5.477	11	22 25 27.09	1.9592	12 18 2.7	8.607
12	20 49 24.89	2.1346	17 57 25.7	5.559	12	22 27 24.55	1.9561	12 9 24.8	8.655
13	20 51 32.84	2.1305	17 51 49.7	5.642	13	22 29 21.82	1.9529	12 0 44.1	8.702
14	20 53 40.55	2.1265	17 46 8.7	5.723	14	22 31 18.90	1.9498	11 52 0.6	8.748
15	20 55 48.02	2.1225	17 40 22.9	5.803	15	22 33 15.80	1.9468	11 43 14.3	8.793
16	20 57 55.25	2.1185	17 34 32.3	5.882	16	22 35 12.52	1.9439	11 34 25.4	8.837
17	21 0 2.24	2.1145	17 28 36.9	5.963	17	22 37 9.07	1.9410	11 25 33.8	8.882
18	21 2 8.99	2.1105	17 22 36.7	6.042	18	22 39 5.44	1.9381	11 16 39.5	8.926
19	21 4 15.50	2.1065	17 16 31.8	6.119	19	22 41 1.64	1.9352	11 7 42.7	8.967
20	21 6 21.77	2.1025	17 10 22.4	6.195	20	22 42 57.67	1.9324	10 58 43.4	9.011
21	21 8 27.80	2.0985	17 4 8.4	6.273	21	22 44 53.53	1.9296	10 49 41.4	9.053
22	21 10 33.59	2.0945	16 57 49.8	6.347	22	22 46 49.22	1.9269	10 40 37.0	9.092
23	21 12 39.14	2.0905	16 51 26.7	6.422	23	22 48 44.76	1.9243	10 31 30.3	9.132
24	21 14 44.45	2.0865	S. 16 44 59.2	6.495	24	22 50 40.14	1.9217	S. 10 22 21.1	9.172



GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 29.					WEDNESDAY 30.				
0	22 <sup>h</sup> 50 <sup>m</sup> 40.14 <sup>s</sup>	1.9917	S. 10° 22' 21.1"	9.172	0	23 <sup>h</sup> 36 <sup>m</sup> 8.53 <sup>s</sup>	1.8723	S. 6° 32' 21.2"	9.936
1	22 52 35.36	1.9150	10 13 9.6	9.211	1	23 38 0.83	1.8710	6 22 24.3	9.961
2	22 54 30.42	1.9165	10 3 55.8	9.249	2	23 39 53.05	1.8696	6 12 25.9	9.985
3	22 56 25.34	1.9141	9 54 39.7	9.287	3	23 41 45.18	1.8682	6 2 26.1	10.007
4	22 58 20.11	1.9116	9 45 21.3	9.324	4	23 43 37.23	1.8670	5 52 25.0	10.030
5	23 0 14.73	1.9092	9 36 0.8	9.360	5	23 45 29.22	1.8658	5 42 22.5	10.053
6	23 2 9.21	1.9067	9 26 38.1	9.396	6	23 47 21.13	1.8646	5 32 18.6	10.075
7	23 4 3.54	1.9044	9 17 13.3	9.431	7	23 49 12.97	1.8635	5 22 13.5	10.096
8	23 5 57.74	1.9022	9 7 46.4	9.466	8	23 51 4.75	1.8624	5 12 7.1	10.117
9	23 7 51.81	1.9000	8 58 17.4	9.500	9	23 52 56.46	1.8614	5 1 59.5	10.136
10	23 9 45.74	1.8978	8 48 46.4	9.532	10	23 54 48.12	1.8605	4 51 50.8	10.155
11	23 11 39.55	1.8957	8 39 13.5	9.565	11	23 56 39.72	1.8595	4 41 40.9	10.174
12	23 13 33.22	1.8935	8 29 38.6	9.597	12	23 58 31.26	1.8587	4 31 29.9	10.192
13	23 15 26.77	1.8915	8 20 1.7	9.630	13	0 0 22.76	1.8579	4 21 17.8	10.211
14	23 17 20.20	1.8895	8 10 23.0	9.660	14	0 2 14.21	1.8572	4 11 4.6	10.227
15	23 19 13.51	1.8876	8 0 42.5	9.690	15	0 4 5.62	1.8565	4 0 50.4	10.244
16	23 21 6.71	1.8858	7 51 0.2	9.720	16	0 5 56.99	1.8558	3 50 35.3	10.259
17	23 22 59.80	1.8839	7 41 16.1	9.749	17	0 7 48.32	1.8552	3 40 19.3	10.275
18	23 24 52.78	1.8822	7 31 30.3	9.777	18	0 9 39.62	1.8547	3 30 2.3	10.291
19	23 26 45.66	1.8803	7 21 42.8	9.806	19	0 11 30.89	1.8542	3 19 44.4	10.305
20	23 28 38.42	1.8789	7 11 53.6	9.833	20	0 13 22.13	1.8538	3 9 25.7	10.318
21	23 30 31.09	1.8771	7 2 2.8	9.859	21	0 15 13.35	1.8536	2 59 6.2	10.332
22	23 32 23.67	1.8755	6 52 10.5	9.885	22	0 17 4.56	1.8532	2 48 45.8	10.345
23	23 34 16.15	1.8738	6 42 16.6	9.911	23	0 18 55.74	1.8528	2 38 24.8	10.357
24	23 36 8.53	1.8720	S. 6 32 21.2	9.936	24	0 20 46.90	1.8527	S. 2 28 2.9	10.368

PHASES OF THE MOON.

☾ Last Quarter,	d	h	m
● New Moon,	9	15	52.0
☾ First Quarter,	16	14	15.3
○ Full Moon,	23	13	38.9

☾ Apogee,	d	h
☾ Perigee,	15	21.8
☾ Apogee,	30	6.3

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Antares W.	84° 5' 36"	3095	85° 33' 52"	3099	87° 2' 3"	3103	88° 30' 9"	3108
	Saturn W.	78 8 41	3017	79 38 33	3022	81 8 19	3026	82 38 0	3030
	α Aquilæ W.	43 55 23	4374	45 1 8	4311	46 7 50	4252	47 15 27	4199
	α Arietis E.	64 28 50	3230	63 3 16	3241	61 37 55	3250	60 12 45	3260
	Jupiter E.	65 37 31	3133	64 10 2	3139	62 42 40	3143	61 15 23	3148
	SUN E.	98 47 24	3416	97 25 26	3423	96 3 35	3427	94 41 49	3431
2	Antares W.	95 49 34	3121	97 17 18	3123	98 45 0	3124	100 12 40	3124
	Saturn W.	90 5 19	3043	91 34 38	3044	93 3 56	3045	94 33 13	3045
	α Aquilæ W.	53 4 52	3992	54 16 39	3958	55 29 0	3928	56 41 51	3900
	α Arietis E.	53 9 55	3313	51 45 58	3325	50 22 15	3337	48 58 46	3349
	Jupiter E.	54 0 12	3164	52 33 20	3166	51 6 30	3168	49 39 42	3168
	SUN E.	87 53 59	3445	86 32 34	3446	85 11 9	3447	83 49 46	3446
3	Saturn W.	101 59 47	3039	103 29 11	3036	104 58 39	3034	106 28 10	3030
	α Aquilæ W.	62 52 52	3779	64 8 16	3759	65 24 1	3739	66 40 7	3720
	Fomalhaut W.	28 59 13	4320	30 5 47	4204	31 14 5	4111	32 23 56	4025
	α Arietis E.	42 5 14	3426	40 43 27	3446	39 22 3	3468	38 1 3	3493
	Jupiter E.	42 25 48	3168	40 59 0	3165	39 32 10	3164	38 5 18	3163
	SUN E.	77 2 39	3440	75 41 8	3438	74 19 34	3434	72 57 56	3431
4	α Aquilæ W.	73 5 18	3637	74 23 12	3623	75 41 22	3608	76 59 48	3593
	Fomalhaut W.	38 32 2	3706	39 48 43	3658	41 6 15	3614	42 24 34	3574
	α Pegasi W.	28 33 33	5240	29 27 25	5030	30 23 57	4847	31 22 55	4686
	Jupiter E.	30 50 23	3152	29 23 16	3149	27 56 6	3148	26 28 54	3146
	α Arietis E.	31 24 13	3677	30 7 1	3732	28 50 48	3796	27 35 42	3873
	SUN E.	66 8 32	3405	64 46 21	3398	63 24 2	3391	62 1 35	3384
5	α Aquilæ W.	83 35 39	3529	84 55 31	3518	86 15 35	3506	87 35 52	3496
	Fomalhaut W.	49 6 19	3408	50 28 27	3379	51 51 7	3352	53 14 18	3327
	α Pegasi W.	36 47 49	4105	37 57 46	4020	39 9 6	3943	40 21 42	3874
	SUN E.	55 7 9	3342	53 43 46	3332	52 20 12	3323	50 56 27	3313
6	α Aquilæ W.	94 20 10	3447	95 41 33	3439	97 3 5	3431	98 24 46	3425
	Fomalhaut W.	60 17 12	3214	61 43 5	3193	63 9 23	3173	64 36 4	3153
	α Pegasi W.	46 41 0	3594	47 59 41	3548	49 19 11	3507	50 39 27	3469
	SUN E.	43 54 45	3260	42 29 47	3249	41 4 36	3238	39 39 12	3227
7	α Aquilæ W.	105 14 51	3400	106 37 7	3399	107 59 25	3397	109 21 45	3397
	Fomalhaut W.	71 55 14	3063	73 24 9	3046	74 53 25	3029	76 23 2	3014
	α Pegasi W.	57 31 8	3299	58 55 21	3270	60 20 7	3242	61 45 26	3216
	SUN E.	32 28 54	3172	31 2 11	3162	29 35 16	3152	28 8 9	3143
11	SUN W.	17 3 21	2833	18 37 6	2814	20 11 16	2795	21 45 50	2779
	Regulus E.	50 41 42	2426	48 58 45	2417	47 15 35	2410	45 32 14	2401
	Mars E.	62 4 26	2586	60 25 12	2579	58 45 48	2570	57 6 12	2563
	Spica E.	104 30 6	2458	102 47 54	2450	101 5 30	2441	99 22 53	2433
12	SUN W.	29 43 42	2712	31 20 6	2701	32 56 44	2692	34 33 34	2683
	Regulus E.	36 52 48	2367	35 8 26	2361	33 23 55	2356	31 39 16	2350
	Mars E.	48 45 40	2527	47 5 5	2522	45 24 22	2516	43 43 31	2510
	Spica E.	90 47 3	2396	89 3 23	2390	87 19 34	2384	85 35 37	2379
13	SUN W.	42 40 28	2648	44 18 18	2643	45 56 15	2637	47 34 20	2632
	Mars E.	35 17 28	2487	33 35 57	2485	31 54 22	2482	30 12 43	2479

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Antares W.	89° 58' 9"	3110	91° 26' 6"	3114	92° 53' 58"	3117	94° 21' 47"	3119
	Saturn W.	84° 7' 35"	3034	85° 37' 6"	3037	87° 6' 33"	3039	88° 35' 57"	3041
	α Aquilæ W.	48° 23' 54"	4151	49° 33' 7"	4108	50° 43' 3"	4065	51° 53' 39"	4027
	α Arietis E.	58° 47' 47"	3270	57° 23' 1"	3281	55° 58' 27"	3291	54° 34' 5"	3301
	Jupiter E.	59° 48' 12"	3153	58° 21' 6"	3156	56° 54' 4"	3159	55° 27' 6"	3163
	Sun E.	93° 20' 8"	3435	91° 58' 31"	3438	90° 36' 58"	3441	89° 15' 28"	3442
2	Antares W.	101° 40' 20"	3194	103° 8' 0"	3195	104° 35' 39"	3194	106° 3' 20"	3194
	Saturn W.	96° 2' 30"	3044	97° 31' 48"	3044	99° 1' 6"	3043	100° 30' 26"	3042
	α Aquilæ W.	57° 55' 11"	3872	59° 8' 59"	3847	60° 23' 13"	3823	61° 37' 51"	3801
	α Arietis E.	47° 35' 31"	3369	46° 12' 31"	3377	44° 49' 48"	3391	43° 27' 21"	3408
	Jupiter E.	48° 12' 55"	3168	46° 46' 8"	3169	45° 19' 22"	3168	43° 52' 35"	3168
	Sun E.	82° 28' 22"	3446	81° 6' 58"	3446	79° 45' 34"	3444	78° 24' 7"	3443
3	Saturn W.	107° 57' 45"	3096	109° 27' 25"	3092	110° 57' 11"	3017	112° 27' 3"	3012
	α Aquilæ W.	67° 56' 33"	3703	69° 13' 17"	3686	70° 30' 19"	3668	71° 47' 40"	3659
	Fomalhaut W.	33° 35' 11"	3946	34° 47' 44"	3877	36° 1' 27"	3814	37° 16' 15"	3757
	α Arietis E.	36° 40' 31"	3521	35° 20' 30"	3552	34° 1' 3"	3588	32° 42' 16"	3629
	Jupiter E.	36° 38' 24"	3161	35° 11' 28"	3158	33° 44' 29"	3156	32° 17' 27"	3154
	Sun E.	71° 36' 14"	3426	70° 14' 27"	3422	68° 52' 35"	3416	67° 30' 37"	3410
4	α Aquilæ W.	78° 18' 30"	3591	79° 37' 26"	3567	80° 56' 36"	3554	82° 16' 1"	3542
	Fomalhaut W.	43° 43' 37"	3536	45° 3' 21"	3501	46° 23' 44"	3468	47° 44' 44"	3437
	α Pegasi W.	32° 24' 6"	4542	33° 27' 21"	4415	34° 32' 29"	4301	35° 39' 21"	4198
	Jupiter E.	25° 1' 40"	3145	23° 34' 25"	3145	22° 7' 10"	3147	20° 39' 57"	3150
	α Arietis E.	26° 21' 54"	3962	25° 9' 37"	4071	23° 59' 5"	4198	22° 50' 37"	4353
	Sun E.	60° 39' 0"	3377	59° 16' 17"	3368	57° 53' 24"	3360	56° 30' 22"	3351
5	α Aquilæ W.	88° 56' 21"	3485	90° 17' 2"	3475	91° 37' 54"	3465	92° 58' 57"	3456
	Fomalhaut W.	54° 37' 58"	3303	56° 2' 6"	3279	57° 26' 42"	3257	58° 51' 44"	3235
	α Pegasi W.	41° 35' 28"	3809	42° 50' 21"	3749	44° 6' 16"	3693	45° 23' 10"	3641
	Sun E.	49° 32' 31"	3303	48° 8' 23"	3293	46° 44' 3"	3282	45° 19' 30"	3271
6	α Aquilæ W.	99° 46' 34"	3419	101° 8' 29"	3413	102° 30' 31"	3408	103° 52' 39"	3404
	Fomalhaut W.	66° 3' 9"	3134	67° 30' 37"	3115	68° 58' 28"	3098	70° 26' 40"	3080
	α Pegasi W.	52° 0' 26"	3431	53° 22' 8"	3395	54° 44' 30"	3361	56° 7' 31"	3330
	Sun E.	38° 13' 35"	3215	36° 47' 44"	3204	35° 21' 40"	3194	33° 55' 24"	3183
7	α Aquilæ W.	110° 44' 5"	3399	112° 6' 23"	3400	113° 28' 39"	3405	114° 50' 50"	3410
	Fomalhaut W.	77° 52' 58"	2997	79° 23' 14"	2982	80° 53' 49"	2967	82° 24' 43"	2953
	α Pegasi W.	63° 11' 16"	3191	64° 37' 36"	3166	66° 4' 26"	3143	67° 31' 44"	3120
	Sun E.	26° 40' 52"	3133	25° 13' 23"	3127	23° 45' 46"	3120	22° 18' 1"	3115
11	Sun W.	23° 20' 46"	2763	24° 56' 3"	2748	26° 31' 39"	2735	28° 7' 32"	2722
	Regulus E.	43° 48' 41"	2394	42° 4' 58"	2387	40° 21' 4"	2391	38° 37' 1"	2373
	Mars E.	55° 26' 26"	2555	53° 46' 29"	2548	52° 6' 22"	2541	50° 26' 6"	2534
	Spica E.	97° 40' 5"	2424	95° 57' 5"	2417	94° 13' 55"	2410	92° 30' 34"	2403
12	Sun W.	36° 10' 37"	2675	37° 47' 50"	2667	39° 25' 14"	2660	41° 2' 47"	2655
	Regulus E.	29° 54' 30"	2346	28° 9' 37"	2341	26° 24' 37"	2337	24° 39' 31"	2333
	Mars E.	42° 2' 32"	2504	40° 21' 25"	2500	38° 40' 12"	2496	36° 58' 53"	2492
	Spica E.	83° 51' 32"	2374	82° 7' 20"	2368	80° 23' 0"	2364	78° 38' 34"	2360
13	Sun W.	49° 12' 31"	2628	50° 50' 48"	2624	52° 29' 11"	2619	54° 7' 40"	2616
	Mars E.	28° 31' 0"	2477	26° 49' 14"	2475	25° 7' 25"	2473	23° 25' 34"	2472

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
13	Spica	E.	76° 54' 2"	2356	75° 9' 24"	2353	73° 24' 41"	2349	71° 39' 53"	2346
14	SUN	W.	55 46 13	2612	57 24 51	2610	59 3 33	2607	60 42 18	2604
	Spica	E.	62 55 3	2337	61 9 58	2337	59 24 52	2336	57 39 45	2337
	Antares	E.	108 47 44	2355	107 3 5	2353	105 18 22	2349	103 33 34	2347
	Saturn	E.	113 55 57	2279	112 9 26	2276	110 22 51	2274	108 36 13	2272
15	SUN	W.	68 56 49	2596	70 35 50	2595	72 14 52	2594	73 53 55	2593
	Spica	E.	48 54 23	2349	47 9 25	2345	45 24 31	2348	43 39 42	2353
	Antares	E.	94 48 47	2338	93 3 43	2337	91 18 37	2336	89 33 30	2336
	Saturn	E.	99 42 29	2266	97 55 39	2265	96 8 48	2264	94 21 56	2264
16	SUN	W.	82 9 20	2593	83 48 25	2593	85 27 29	2593	87 6 33	2594
	Regulus	W.	19 37 43	2291	21 23 56	2290	23 10 10	2289	24 56 25	2289
	Spica	E.	34 57 33	2387	33 13 40	2398	31 30 2	2412	29 46 44	2426
	Antares	E.	80 47 58	2338	79 2 54	2339	77 17 51	2341	75 32 51	2343
	Saturn	E.	85 27 34	2265	83 40 43	2265	81 53 52	2266	80 7 2	2267
17	SUN	W.	95 21 30	2601	97 0 24	2609	98 39 16	2604	100 18 5	2607
	Regulus	W.	33 47 31	2294	35 33 40	2295	37 19 47	2296	39 5 52	2298
	Mars	W.	19 26 20	2470	21 8 16	2470	22 50 11	2470	24 32 7	2470
	Antares	E.	66 48 38	2355	65 3 59	2359	63 19 25	2363	61 34 57	2367
	Saturn	E.	71 13 18	2273	69 26 39	2275	67 40 3	2277	65 53 29	2279
	α Aquilæ	E.	112 9 2	2247	110 37 43	2233	109 6 6	2222	107 34 15	2212
18	SUN	W.	108 31 24	2619	110 9 53	2622	111 48 18	2625	113 26 39	2629
	Regulus	W.	47 55 36	2309	49 41 22	2311	51 27 5	2314	53 12 44	2317
	Mars	W.	33 1 27	2477	34 43 12	2480	36 24 54	2482	38 6 32	2485
	Antares	E.	52 54 22	2395	51 10 40	2403	49 27 9	2410	47 43 48	2419
	Saturn	E.	57 1 33	2291	55 15 21	2295	53 29 14	2298	51 43 12	2301
	α Aquilæ	E.	99 52 19	2281	98 19 36	2278	96 46 49	2277	95 14 1	2276
19	SUN	W.	121 37 8	2648	123 14 58	2653	124 52 41	2658	126 30 17	2663
	Regulus	W.	61 59 47	2335	63 44 56	2339	65 29 59	2342	67 14 57	2347
	Mars	W.	46 33 37	2502	48 14 47	2507	49 55 51	2511	51 36 49	2515
	Antares	E.	39 10 39	2477	37 28 54	2483	35 47 31	2512	34 6 34	2532
	Saturn	E.	42 54 19	2321	41 8 50	2326	39 23 29	2331	37 38 15	2337
	α Aquilæ	E.	87 30 26	2293	85 57 58	2299	84 25 38	2307	82 53 28	2316
20	Regulus	W.	75 58 4	2371	77 42 20	2377	79 26 28	2383	81 10 27	2389
	Mars	W.	60 0 0	2541	61 40 16	2546	63 20 25	2553	65 0 25	2559
	Spica	W.	23 4 3	2577	24 43 30	2557	26 23 24	2542	28 3 39	2530
	α Aquilæ	E.	75 15 55	2277	73 45 14	2295	72 14 55	2313	70 44 58	2331
	Fomalhaut	E.	108 40 58	2640	107 2 58	2640	105 24 58	2641	103 46 59	2644
21	Regulus	W.	89 48 10	2422	91 31 14	2429	93 14 8	2436	94 56 51	2444
	Mars	W.	73 18 11	2593	74 57 15	2601	76 36 9	2609	78 14 52	2617
	Spica	W.	36 27 35	2510	38 8 34	2511	39 49 32	2512	41 30 28	2515
	α Aquilæ	E.	63 21 51	3156	61 54 49	3188	60 28 25	3221	59 2 41	3259
	Fomalhaut	E.	95 38 9	2664	94 0 41	2671	92 23 22	2678	90 46 13	2685
	α Pegasi	E.	110 33 50	2228	108 59 59	2227	107 26 6	2227	105 52 13	2226
22	Regulus	W.	103 27 38	2486	105 9 11	2484	106 50 32	2503	108 31 41	2513
	Mars	W.	86 25 36	2660	88 3 9	2670	89 40 29	2680	91 17 36	2689
	Spica	W.	49 53 52	2539	51 34 11	2545	53 14 21	2552	54 54 22	2560

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
13	Spica	E.	69° 55' 1"	2344	68° 10' 5"	2342	66° 25' 7"	2340	64° 40' 6"	2333
14	Sun	W.	62 21 7	2302	63 59 59	2301	65 38 53	2599	67 17 50	2597
	Spica	E.	55 54 39	2336	54 9 32	2337	52 24 27	2339	50 39 24	2340
	Antares	E.	101 48 43	2344	100 3 48	2342	98 18 50	2341	96 33 50	2339
	Saturn	E.	106 49 33	2370	105 2 50	2369	103 16 5	2365	101 29 18	2366
15	Sun	W.	75 32 59	2593	77 12 4	2593	78 51 9	2592	80 30 15	2593
	Spica	E.	41 55 0	2357	40 10 24	2364	38 25 57	2370	36 41 39	2378
	Antares	E.	87 48 23	2336	86 3 16	2337	84 18 10	2336	82 33 3	2337
	Saturn	E.	92 35 4	2364	90 48 12	2364	89 1 19	2364	87 14 26	2364
16	Sun	W.	88 45 36	2596	90 24 37	2597	92 3 36	2598	93 42 34	2599
	Regulus	W.	26 42 40	2389	28 28 55	2391	30 15 8	2391	32 1 20	2392
	Spica	E.	28 3 47	2445	26 21 17	2467	24 39 18	2495	22 57 58	2529
	Antares	E.	73 47 54	2344	72 2 59	2347	70 18 8	2350	68 33 21	2353
	Saturn	E.	78 20 14	2368	76 33 27	2369	74 46 42	2370	72 59 59	2372
17	Sun	W.	101 56 51	2609	103 35 34	2611	105 14 14	2613	106 52 51	2616
	Regulus	W.	40 51 55	2300	42 37 55	2302	44 23 52	2304	46 9 46	2307
	Mars	W.	26 14 2	2471	27 55 56	2472	29 37 48	2473	31 19 39	2475
	Antares	E.	59 50 35	2372	58 6 20	2378	56 22 13	2382	54 38 13	2389
	Saturn	E.	64 6 59	2381	62 20 32	2384	60 34 9	2386	58 47 49	2389
	$\alpha$ Aquilæ	E.	106 2 11	2303	104 29 56	2395	102 57 31	2399	101 24 58	2394
18	Sun	W.	115 4 55	2632	116 43 6	2636	118 21 12	2640	119 59 13	2644
	Regulus	W.	54 58 18	2320	56 43 48	2324	58 29 13	2327	60 14 33	2331
	Mars	W.	39 48 6	2488	41 29 36	2492	43 11 1	2495	44 52 21	2498
	Antares	E.	46 0 41	2428	44 17 46	2439	42 35 7	2450	40 52 44	2463
	Saturn	E.	49 57 14	2305	48 11 22	2309	46 25 35	2313	44 39 54	2317
	$\alpha$ Aquilæ	E.	93 41 12	2378	92 8 25	2380	90 35 41	2383	89 3 1	2387
19	Sun	W.	128 7 47	2668	129 45 10	2674	131 22 25	2680	132 59 32	2684
	Regulus	W.	68 59 48	2332	70 44 32	2356	72 29 10	2361	74 13 41	2366
	Mars	W.	53 17 41	2520	54 58 26	2525	56 39 5	2530	58 19 36	2535
	Antares	E.	32 26 5	2556	30 46 9	2582	29 6 49	2613	27 28 12	2650
	Saturn	E.	35 53 9	2342	34 8 11	2348	32 23 22	2355	30 38 42	2362
	$\alpha$ Aquilæ	E.	81 21 29	2326	79 49 43	2338	78 18 12	2349	76 46 55	2362
20	Regulus	W.	82 54 17	2326	84 37 59	2401	86 21 32	2408	88 4 56	2415
	Mars	W.	66 40 16	2565	68 19 59	2572	69 59 32	2579	71 38 56	2585
	Spica	W.	29 44 10	2522	31 24 52	2517	33 5 42	2512	34 46 38	2512
	$\alpha$ Aquilæ	E.	69 15 24	2052	67 46 16	2076	66 17 37	2101	64 49 28	2127
	Fomalhaut	E.	102 9 4	2646	100 31 12	2650	98 53 25	2655	97 15 44	2659
21	Regulus	W.	96 39 23	2452	98 21 44	2460	100 3 54	2468	101 45 52	2477
	Mars	W.	79 53 24	2625	81 31 45	2633	83 9 55	2643	84 47 52	2652
	Spica	W.	43 11 20	2519	44 52 7	2523	46 32 48	2527	48 13 23	2532
	$\alpha$ Aquilæ	E.	57 37 41	2327	56 13 26	2340	54 50 1	2386	53 27 29	2437
	Fomalhaut	E.	89 9 13	2692	87 32 23	2702	85 55 46	2711	84 19 21	2721
	$\alpha$ Pegasi	E.	104 18 22	2630	102 44 33	2634	101 10 49	2637	99 37 9	2642
22	Regulus	W.	110 12 36	2522	111 53 18	2532	113 33 47	2542	115 14 2	2552
	Mars	W.	92 54 30	2700	94 31 10	2710	96 7 37	2720	97 43 50	2731
	Spica	W.	56 34 12	2567	58 13 52	2575	59 53 21	2583	61 32 39	2593

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
22	$\alpha$ Aquilæ E.	52° 5' 54"	3492	50° 45' 21"	3551	49° 25' 53"	3614	48° 7' 34"	3685
	Fomalhaut E.	82 43 9	2732	81 7 11	2743	79 31 28	2755	77 56 1	2767
	$\alpha$ Pegasi E.	98 3 36	2848	96 30 10	2855	94 56 53	2862	93 23 45	2869
23	Mars W.	99 19 49	2742	100 55 33	2753	102 31 3	2765	104 6 17	2775
	Spica W.	63 11 44	2801	64 50 37	2811	66 29 17	2821	68 7 44	2831
	Antares W.	18 52 2	3100	20 20 12	3032	21 49 45	2961	23 20 22	2941
	Fomalhaut E.	70 3 7	2840	68 29 31	2856	66 56 16	2875	65 23 25	2893
	$\alpha$ Pegasi E.	85 41 0	2921	84 9 8	2935	82 37 33	2948	81 6 15	2962
24	Spica W.	76 16 33	2884	77 53 35	2894	79 30 23	2705	81 6 56	2716
	Antares W.	31 2 33	2851	32 35 55	2846	34 9 23	2842	35 42 57	2840
	Saturn W.	25 43 49	2648	27 21 39	2658	28 59 15	2667	30 36 39	2678
	Fomalhaut E.	57 45 25	3001	56 15 13	3026	54 45 32	3052	53 16 24	3080
	$\alpha$ Pegasi E.	73 34 26	3044	72 5 8	3062	70 36 12	3069	69 7 41	3103
25	Spica W.	89 5 54	2775	90 40 55	2786	92 15 41	2798	93 50 12	2810
	Antares W.	43 30 32	2855	45 3 49	2860	46 36 59	2866	48 10 1	2873
	Saturn W.	38 40 13	2730	40 16 13	2741	41 51 58	2753	43 27 28	2763
	Fomalhaut E.	45 59 57	3249	44 34 46	3290	43 10 23	3334	41 46 51	3383
	$\alpha$ Pegasi E.	61 51 44	3221	60 26 0	3248	59 0 48	3277	57 36 10	3306
	$\alpha$ Arietis E.	104 15 56	2905	102 43 43	2914	101 11 42	2924	99 39 54	2935
	Jupiter E.	111 43 8	2830	110 9 6	2831	108 35 19	2844	107 1 48	2855
26	Antares W.	55 52 48	2913	57 24 50	2922	58 56 41	2931	60 28 21	2939
	Saturn W.	51 21 21	2819	52 55 24	2830	54 29 13	2841	56 2 48	2852
	$\alpha$ Pegasi E.	50 42 21	3486	49 21 41	3528	48 1 48	3574	46 42 45	3623
	$\alpha$ Arietis E.	92 4 13	2989	90 33 46	3000	89 3 33	3011	87 33 34	3022
	Jupiter E.	99 17 52	2912	97 45 49	2924	96 14 0	2935	94 42 25	2946
27	Antares W.	68 3 57	2922	69 34 32	2922	71 4 55	3000	72 35 8	3008
	Saturn W.	63 47 19	2903	65 19 34	2912	66 51 37	2922	68 23 28	2931
	$\alpha$ Pegasi E.	40 21 55	3931	39 9 7	4011	37 57 38	4098	36 47 34	4193
	$\alpha$ Arietis E.	80 7 10	3060	78 38 36	3091	77 10 16	3103	75 42 10	3114
	Jupiter E.	87 7 55	2998	85 37 40	3009	84 7 38	3018	82 37 48	3027
	Sun E.	139 47 42	3284	138 23 12	3294	136 58 54	3305	135 34 48	3313
28	Antares W.	80 3 41	3047	81 32 55	3055	83 2 0	3061	84 30 57	3068
	Saturn W.	75 59 56	2973	77 30 42	2981	79 1 19	2988	80 31 47	2995
	$\alpha$ Aquilæ W.	41 9 26	4555	42 12 30	4473	43 16 46	4398	44 22 9	4331
	$\alpha$ Arietis E.	68 25 11	3173	66 58 29	3184	65 32 1	3196	64 5 47	3208
	Jupiter E.	75 11 26	3071	73 42 41	3079	72 14 6	3087	70 45 40	3093
	Sun E.	128 36 52	3357	127 13 46	3365	125 50 50	3372	124 28 2	3379
29	Antares W.	91 53 47	3096	93 22 1	3101	94 50 9	3105	96 18 12	3110
	Saturn W.	88 2 6	3024	89 31 49	3028	91 1 27	3032	92 31 0	3036
	$\alpha$ Aquilæ W.	50 2 45	4079	51 13 7	4039	52 24 8	4005	53 35 43	3972
	$\alpha$ Arietis E.	56 58 10	3269	55 33 22	3282	54 8 49	3294	52 44 31	3308
	Jupiter E.	63 25 31	3194	61 57 51	3129	60 30 16	3133	59 2 47	3138
	Sun E.	117 35 56	3409	116 13 50	3415	114 51 50	3418	113 29 54	3423
30	$\alpha$ Aquilæ W.	59 40 56	3843	60 55 14	3821	62 9 54	3802	63 24 54	3783
	$\alpha$ Arietis E.	45 47 12	3386	44 24 40	3405	43 2 29	3424	41 40 40	3446
	Jupiter E.	51 46 28	3153	50 19 22	3155	48 52 19	3157	47 25 18	3157
	Sun E.	106 41 13	3435	105 19 36	3436	103 58 0	3437	102 36 25	3437

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
22	$\alpha$ Aquilæ	E.	46° 50' 31"	3763	45° 34' 50"	3847	44° 20' 36"	3838	43° 7' 55"	4040
	Fomalhaut	E.	76 20 50	2780	74 45 56	2794	73 11 20	2808	71 37 3	2825
	$\alpha$ Pegasi	E.	91 50 46	2879	90 18 0	2889	88 45 27	2898	87 13 6	2910
23	Mars	W.	105 41 17	2788	107 16 1	2798	108 50 31	2811	110 24 45	2822
	Spica	W.	69 45 57	2640	71 23 57	2651	73 1 43	2661	74 39 15	2672
	Antares	W.	24 51 49	2919	26 23 53	2888	27 56 27	2872	29 29 22	2859
	Fomalhaut	E.	63 50 57	2912	62 18 54	2932	60 47 16	2964	59 16 6	2977
	$\alpha$ Pegasi	E.	79 35 14	2977	78 4 32	2993	76 34 10	3009	75 4 8	3025
24	Spica	W.	82 43 14	2728	84 19 17	2739	85 55 5	2751	87 30 37	2763
	Antares	W.	37 16 33	2841	38 50 8	2843	40 23 40	2845	41 57 10	2851
	Saturn	W.	32 13 49	2887	33 50 46	2898	35 27 29	2708	37 3 58	2719
	Fomalhaut	E.	51 47 50	3110	50 19 52	3141	48 52 32	3175	47 25 53	3211
	$\alpha$ Pegasi	E.	67 39 35	3124	66 11 55	3148	64 44 43	3171	63 17 59	3195
25	Spica	W.	95 24 27	2821	96 58 27	2834	98 32 11	2845	100 5 40	2857
	Antares	W.	49 42 54	2881	51 15 37	2888	52 48 11	2896	54 20 35	2905
	Saturn	W.	45 2 44	2775	46 37 45	2785	48 12 32	2797	49 47 4	2808
	Fomalhaut	E.	40 24 15	3436	39 2 39	3492	37 42 6	3555	36 22 43	3624
	$\alpha$ Pegasi	E.	56 12 8	3338	54 48 41	3372	53 25 53	3408	52 3 46	3446
	$\alpha$ Arietis	E.	98 8 19	2945	96 36 57	2956	95 5 49	2966	93 34 54	2977
	Jupiter	E.	105 28 31	2866	103 55 29	2878	102 22 42	2890	100 50 10	2901
26	Antares	W.	61 59 51	2948	63 31 9	2957	65 2 16	2965	66 33 12	2974
	Saturn	W.	57 36 9	2882	59 9 16	2873	60 42 10	2883	62 14 51	2893
	$\alpha$ Pegasi	E.	45 24 35	3675	44 7 21	3732	42 51 8	3792	41 35 58	3857
	$\alpha$ Arietis	E.	86 3 49	3034	84 34 18	3045	83 5 1	3056	81 35 58	3069
	Jupiter	E.	93 11 4	2957	91 39 57	2967	90 9 3	2977	88 38 22	2989
27	Antares	W.	74 5 11	3017	75 35 3	3025	77 4 45	3033	78 34 17	3039
	Saturn	W.	69 55 8	2940	71 26 36	2949	72 57 53	2957	74 29 0	2965
	$\alpha$ Pegasi	E.	35 39 1	4300	34 32 8	4418	33 27 3	4551	32 23 55	4697
	$\alpha$ Arietis	E.	74 14 18	3126	72 46 40	3138	71 19 17	3149	69 52 7	3161
	Jupiter	E.	81 8 9	3037	79 38 42	3046	78 9 26	3055	76 40 21	3063
	SUN	E.	134 10 52	3323	132 47 7	3332	131 23 32	3340	130 0 7	3349
28	Antares	W.	85 59 46	3075	87 28 26	3080	88 57 0	3085	90 25 28	3092
	Saturn	W.	82 2 6	3001	83 32 17	3008	85 2 20	3014	86 32 16	3018
	$\alpha$ Aquilæ	W.	45 28 33	4271	46 35 52	4215	47 44 4	4165	48 53 3	4120
	$\alpha$ Arietis	E.	62 39 47	3220	61 14 1	3232	59 48 30	3244	58 23 13	3257
	Jupiter	E.	69 17 22	3101	67 49 13	3107	66 21 12	3113	64 53 18	3119
	SUN	E.	123 5 22	3386	121 42 50	3393	120 20 25	3399	118 58 7	3405
29	Antares	W.	97 46 9	3114	99 14 2	3117	100 41 51	3120	102 9 36	3123
	Saturn	W.	94 0 28	3039	95 29 52	3043	96 59 12	3045	98 28 29	3047
	$\alpha$ Aquilæ	W.	54 47 50	3942	56 0 26	3916	57 13 30	3899	58 27 1	3865
	$\alpha$ Arietis	E.	51 20 29	3322	49 56 43	3338	48 33 15	3352	47 10 4	3369
	Jupiter	E.	57 35 23	3141	56 8 3	3145	54 40 48	3148	53 13 36	3151
	SUN	E.	112 8 3	3426	110 46 16	3429	109 24 32	3431	108 2 51	3434
30	$\alpha$ Aquilæ	W.	64 40 14	3766	65 55 52	3748	67 11 48	3732	68 28 1	3718
	$\alpha$ Arietis	E.	40 19 15	3469	38 58 16	3495	37 37 46	3523	36 17 47	3554
	Jupiter	E.	45 58 17	3158	44 31 17	3158	43 4 18	3158	41 37 19	3158
	SUN	E.	101 14 50	3436	99 53 14	3435	98 31 37	3434	97 9 59	3433

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sideral Time of the Semi-diameter passing the Meridian.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.			
Thur.	1	<sup>h</sup> 6 <sup>m</sup> 41 <sup>s</sup> 49.99	10.336	N. 23° 6' 21.2"	10.33	15' 46".14	68.78	<sup>m</sup> 3 <sup>s</sup> 31.11	0.480
Frid.	2	6 45 57.98	10.326	23 2 1.1	11.34	15 46.13	68.74	3 42.51	0.470
Sat.	3	6 50 5.71	10.315	22 57 16.8	12.34	15 46.12	68.70	3 53.66	0.459
Sun.	4	6 54 13.17	10.303	22 52 8.6	13.34	15 46.12	68.66	4 4.53	0.447
Mon.	5	6 58 20.31	10.290	22 46 36.4	14.33	15 46.13	68.61	4 15.08	0.434
Tues.	6	7 2 27.13	10.276	22 40 40.5	15.32	15 46.14	68.56	4 25.31	0.420
Wed.	7	7 6 33.61	10.261	22 34 21.0	16.30	15 46.16	68.51	4 35.21	0.405
Thur.	8	7 10 39.71	10.245	22 27 38.0	17.27	15 46.18	68.46	4 44.73	0.389
Frid.	9	7 14 45.42	10.228	22 20 31.8	18.24	15 46.21	68.40	4 53.85	0.372
Sat.	10	7 18 50.71	10.210	22 13 2.4	19.20	15 46.24	68.34	5 2.57	0.354
Sun.	11	7 22 55.57	10.192	22 5 10.1	20.15	15 46.28	68.28	5 10.85	0.336
Mon.	12	7 26 59.98	10.173	21 56 55.0	21.09	15 46.33	68.22	5 18.69	0.317
Tues.	13	7 31 3.91	10.153	21 48 17.4	22.03	15 46.38	68.15	5 26.04	0.297
Wed.	14	7 35 7.36	10.132	21 39 17.3	22.96	15 46.43	68.08	5 32.89	0.276
Thur.	15	7 39 10.29	10.111	21 29 55.1	23.88	15 46.49	68.01	5 39.24	0.255
Frid.	16	7 43 12.69	10.089	21 20 10.9	24.79	15 46.55	67.94	5 45.08	0.233
Sat.	17	7 47 14.56	10.067	21 10 5.0	25.69	15 46.62	67.87	5 50.39	0.211
Sun.	18	7 51 15.88	10.044	20 59 37.5	26.58	15 46.69	67.80	5 55.14	0.188
Mon.	19	7 55 16.63	10.020	20 48 48.9	27.46	15 46.77	67.72	5 59.33	0.164
Tues.	20	7 59 16.82	9.997	20 37 39.3	28.34	15 46.85	67.64	6 2.96	0.141
Wed.	21	8 3 16.45	9.973	20 26 8.8	29.20	15 46.94	67.56	6 6.02	0.117
Thur.	22	8 7 15.51	9.949	20 14 17.5	30.05	15 47.03	67.48	6 8.51	0.093
Frid.	23	8 11 13.98	9.925	20 2 6.1	30.89	15 47.12	67.40	6 10.43	0.069
Sat.	24	8 15 11.87	9.901	19 49 34.7	31.72	15 47.21	67.32	6 11.77	0.045
Sun.	25	8 19 9.19	9.876	19 36 43.5	32.54	15 47.31	67.23	6 12.53	0.020
Mon.	26	8 23 5.92	9.852	19 23 32.6	33.34	15 47.41	67.15	6 12.70	0.004
Tues.	27	8 27 2.06	9.827	19 10 2.6	34.14	15 47.52	67.06	6 12.28	0.029
Wed.	28	8 30 57.61	9.803	18 56 13.6	34.93	15 47.62	66.98	6 11.28	0.053
Thur.	29	8 34 52.58	9.779	18 42 5.8	35.71	15 47.73	66.89	6 9.70	0.077
Frid.	30	8 38 46.96	9.755	18 27 39.4	36.48	15 47.84	66.80	6 7.53	0.101
Sat.	31	8 42 40.76	9.730	18 12 54.8	37.23	15 47.96	66.71	6 4.77	0.126
Sun.	32	8 46 33.98	9.706	N. 17° 57' 52.4"	37.97	15 48.08	66.62	6 1.43	0.150

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.19 from the Sideral Time.



## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be subtracted from Mean Time.	Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.			
Thur.	1	6 <sup>h</sup> 41 <sup>m</sup> 49.38 <sup>s</sup>	10.336	N. 23° 6' 21.8"	10.33	3 <sup>m</sup> 31.08 <sup>s</sup>	0.480	6 <sup>h</sup> 38 <sup>m</sup> 18.20 <sup>s</sup>
Frid.	2	6 45 57.34	10.326	23 2 1.8	11.34	3 42.48	0.470	6 42 14.86
Sat.	3	6 50 5.04	10.315	22 57 17.6	12.34	3 53.63	0.459	6 46 11.41
Sun.	4	6 54 12.47	10.303	22 52 9.5	13.34	4 4.50	0.447	6 50 7.97
Mon.	5	6 58 19.58	10.290	22 46 37.4	14.33	4 15.05	0.434	6 54 4.53
Tues.	6	7 2 26.37	10.276	22 40 41.7	15.32	4 25.28	0.420	6 58 1.09
Wed.	7	7 6 32.82	10.261	22 34 22.3	16.30	4 35.18	0.405	7 1 57.64
Thur.	8	7 10 38.90	10.245	22 27 39.4	17.27	4 44.70	0.389	7 5 54.20
Frid.	9	7 14 44.58	10.228	22 20 33.3	18.24	4 53.82	0.372	7 9 50.76
Sat.	10	7 18 49.85	10.210	22 13 4.1	19.20	5 2.54	0.354	7 13 47.31
Sun.	11	7 22 54.69	10.192	22 5 11.9	20.15	5 10.82	0.336	7 17 43.87
Mon.	12	7 26 59.08	10.173	21 56 56.9	21.09	5 18.66	0.317	7 21 40.42
Tues.	13	7 31 2.99	10.153	21 48 19.3	22.03	5 26.01	0.297	7 25 36.98
Wed.	14	7 35 6.40	10.132	21 39 19.4	22.96	5 32.86	0.276	7 29 33.54
Thur.	15	7 39 9.31	10.111	21 29 57.3	23.88	5 39.21	0.255	7 33 30.10
Frid.	16	7 43 11.71	10.089	21 20 13.2	24.79	5 45.06	0.233	7 37 26.65
Sat.	17	7 47 13.58	10.067	21 10 7.5	25.69	5 50.37	0.211	7 41 23.21
Sun.	18	7 51 14.89	10.044	20 59 40.2	26.58	5 55.12	0.188	7 45 19.77
Mon.	19	7 55 15.63	10.020	20 48 51.7	27.46	5 59.31	0.164	7 49 16.32
Tues.	20	7 59 15.81	9.997	20 37 42.2	28.34	6 2.93	0.141	7 53 12.88
Wed.	21	8 3 15.45	9.973	20 26 11.7	29.20	6 6.01	0.117	7 57 9.44
Thur.	22	8 7 14.51	9.949	20 14 20.6	30.05	6 8.52	0.093	8 1 5.99
Frid.	23	8 11 12.98	9.925	20 2 9.3	30.89	6 10.43	0.069	8 5 2.55
Sat.	24	8 15 10.87	9.901	19 49 38.0	31.72	6 11.77	0.045	8 8 59.10
Sun.	25	8 19 8.19	9.876	19 36 46.9	32.54	6 12.53	0.020	8 12 55.66
Mon.	26	8 23 4.92	9.852	19 23 36.1	33.34	6 12.70	0.004	8 16 52.22
Tues.	27	8 27 1.06	9.827	19 10 6.1	34.14	6 12.29	0.029	8 20 48.77
Wed.	28	8 30 56.61	9.803	18 56 17.2	34.93	6 11.28	0.053	8 24 45.33
Thur.	29	8 34 51.58	9.779	18 42 9.4	35.71	6 9.70	0.077	8 28 41.88
Frid.	30	8 38 45.97	9.755	18 27 43.1	36.48	6 7.53	0.101	8 32 38.44
Sat.	31	8 42 39.78	9.730	18 12 58.6	37.23	6 4.79	0.126	8 36 34.99
Sun.	32	8 46 33.00	9.706	N. 17° 57' 56.2"	37.97	6 1.45	0.150	8 40 31.55

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+ 9".8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.	
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	182	99° 36' 50.9	36' 39.3	142.98	—0.38	0.0072204	2.2	<sup>h</sup> 17 <sup>m</sup> 18 <sup>s</sup> 51.05	
2	183	100 34 2.8	33 51.0	142.99	0.44	.0072247	1.3	17 14 55.14	
3	184	101 31 14.9	31 2.9	143.01	0.46	.0072269	0.4	17 10 59.22	
4	185	102 28 27.3	28 15.1	143.02	0.46	.0072268	0.6	17 7 3.31	
5	186	103 25 40.0	25 27.6	143.03	0.43	.0072242	1.6	17 3 7.40	
6	187	104 22 52.9	22 40.4	143.04	0.37	.0072190	2.7	16 59 11.48	
7	188	105 20 6.1	19 53.4	143.06	0.28	.0072112	3.8	16 55 15.57	
8	189	106 17 19.6	17 6.7	143.07	0.17	.0072009	4.9	16 51 19.66	
9	190	107 14 33.3	14 20.2	143.08	—0.04	.0071881	5.9	16 47 23.75	
10	191	108 11 47.2	11 34.0	143.08	+0.10	.0071726	6.9	16 43 27.84	
11	192	109 9 1.2	8 47.9	143.09	0.24	.0071546	8.0	16 39 31.93	
12	193	110 6 15.4	6 1.9	143.09	0.37	.0071341	9.1	16 35 36.02	
13	194	111 3 29.8	3 16.1	143.10	0.48	.0071109	10.2	16 31 40.11	
14	195	112 0 44.4	0 30.5	143.10	0.57	.0070852	11.2	16 27 44.20	
15	196	112 57 59.1	57 45.1	143.11	0.65	.0070571	12.1	16 23 48.29	
16	197	113 55 13.8	54 59.7	143.12	0.70	.0070270	12.9	16 19 52.39	
17	198	114 52 28.7	52 14.4	143.13	0.72	.0069950	13.7	16 15 56.47	
18	199	115 49 43.9	49 29.4	143.14	0.70	.0069612	14.5	16 12 0.56	
19	200	116 46 59.4	46 44.7	143.15	0.65	.0069257	15.2	16 8 4.65	
20	201	117 44 15.2	44 0.3	143.16	0.57	.0068885	15.9	16 4 8.74	
21	202	118 41 31.4	41 16.3	143.18	0.48	.0068497	16.5	16 0 12.83	
22	203	119 38 48.0	38 32.8	143.20	0.37	.0068094	17.1	15 56 16.92	
23	204	120 36 5.1	35 49.8	143.22	0.25	.0067678	17.6	15 52 21.01	
24	205	121 33 22.8	33 7.4	143.25	+0.12	.0067249	18.2	15 48 25.10	
25	206	122 30 41.2	30 25.6	143.28	—0.01	.0066806	18.7	15 44 29.19	
26	207	123 28 0.4	27 44.7	143.32	0.13	.0066350	19.3	15 40 33.28	
27	208	124 25 20.6	25 4.7	143.36	0.24	.0065880	19.8	15 36 37.36	
28	209	125 22 41.8	22 25.8	143.40	0.33	.0065395	20.4	15 32 41.45	
29	210	126 20 4.1	19 48.0	143.45	0.39	.0064895	21.1	15 28 45.54	
30	211	127 17 27.5	17 11.2	143.49	0.43	.0064380	21.8	15 24 49.63	
31	212	128 14 52.0	14 35.5	143.54	0.44	.0063847	22.6	15 20 53.73	
32	213	129 12 17.6	12 1.0	143.59	—0.41	0.0063294	23.4	15 16 57.82	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>s</sup> .8300	

## GREENWICH MEAN TIME.

Day of the Month.	THE MOON'S								
	SEMIDIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
1	14 49.2	14 50.6	54 16.8	+0.31	54 21.9	+0.52	<sup>h</sup> 18 <sup>m</sup> 13.3	<sup>m</sup> 1.74	<sup>d</sup> 21.3
2	14 52.7	14 55.4	54 29.4	0.74	54 39.5	0.94	18 55.6	1.81	22.3
3	14 58.8	15 2.9	54 52.1	1.14	55 6.9	1.33	19 39.3	1.86	23.3
4	15 7.5	15 12.6	55 23.8	1.49	55 42.6	1.64	20 25.3	1.98	24.3
5	15 18.2	15 24.1	56 3.1	1.76	56 24.8	1.85	21 14.3	2.12	25.3
6	15 30.2	15 36.6	56 47.4	1.91	57 10.6	1.93	22 6.7	2.26	26.3
7	15 42.9	15 49.0	57 33.7	1.92	57 56.5	1.86	23 2.2	2.37	27.3
8	15 55.0	16 0.6	58 18.3	1.77	58 38.8	1.64	<sup>h</sup> 0		28.3
9	16 5.7	16 10.2	58 57.5	1.47	59 14.1	1.28	0 0.1	2.44	29.3
10	16 14.0	16 17.1	59 28.1	1.06	59 39.4	0.82	0 58.9	2.44	0.9
11	16 19.3	16 20.8	59 47.7	0.58	59 53.2	+0.33	1 57.1	2.39	1.9
12	16 21.5	16 21.5	59 55.8	+0.09	59 55.5	-0.13	2 53.6	2.31	2.9
13	16 20.7	16 19.3	59 52.7	-0.34	59 47.5	0.52	3 48.0	2.22	3.9
14	16 17.3	16 14.8	59 40.2	0.69	59 31.1	0.83	4 40.4	2.15	4.9
15	16 11.9	16 8.7	59 20.4	0.94	59 8.5	1.03	5 31.6	2.12	5.9
16	16 5.2	16 1.5	58 55.7	1.09	58 42.3	1.14	6 22.4	2.11	6.9
17	15 57.7	15 53.8	58 28.4	1.18	58 13.9	1.22	7 13.3	2.14	7.9
18	15 49.8	15 45.7	57 59.2	1.24	57 44.3	1.25	8 5.0	2.18	8.9
19	15 41.6	15 37.5	57 29.2	1.26	57 14.1	1.26	8 57.6	2.21	9.9
20	15 33.4	15 29.3	56 58.9	1.26	56 43.8	1.26	9 50.8	2.22	10.9
21	15 25.2	15 21.1	56 28.7	1.25	56 13.8	1.24	10 44.0	2.20	11.9
22	15 17.1	15 13.2	55 59.1	1.21	55 44.7	1.18	11 36.3	2.14	12.9
23	15 9.4	15 5.7	55 30.8	1.14	55 17.3	1.09	12 26.8	2.06	13.9
24	15 2.2	14 59.0	55 4.6	1.03	54 52.7	0.95	13 15.1	1.96	14.9
25	14 56.0	14 53.4	54 41.8	0.86	54 32.0	0.76	14 1.1	1.87	15.9
26	14 51.1	14 49.2	54 23.6	0.64	54 16.8	0.50	14 45.1	1.80	16.9
27	14 47.8	14 47.0	54 11.7	0.34	54 8.5	-0.18	15 27.6	1.75	17.9
28	14 46.7	14 47.0	54 7.4	-0.00	54 8.5	+0.19	16 9.3	1.73	18.9
29	14 47.9	14 49.5	54 11.9	+0.38	54 17.8	0.59	16 50.9	1.75	19.9
30	14 51.7	14 54.7	54 26.0	0.80	54 36.9	1.01	17 33.4	1.80	20.9
31	14 58.3	15 2.6	54 50.2	1.21	55 5.9	1.41	18 17.5	1.89	21.9
32	15 7.5	15 13.1	55 24.0	+1.60	55 44.3	+1.78	19 4.2	2.02	22.9

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 1.					SATURDAY 3.				
0	h m s	° ' "	° ' "	° ' "	0	h m s	° ' "	° ' "	° ' "
1	0 20 46.90	1.8597	S. 2° 28' 2.9	10.368	1	1 50 34.65	1.9108	N. 5° 52' 33.6	10.266
2	0 22 38.06	1.8596	2 17 40.4	10.380	2	1 52 29.38	1.9134	6 2 49.1	10.249
3	0 24 29.21	1.8596	2 7 17.3	10.391	3	1 54 24.26	1.9161	6 13 3.5	10.231
4	0 26 20.36	1.8596	1 56 53.6	10.402	4	1 56 19.30	1.9188	6 23 16.8	10.213
5	0 28 11.52	1.8596	1 46 29.2	10.411	5	1 58 14.51	1.9216	6 33 29.0	10.194
6	0 30 2.68	1.8597	1 36 4.3	10.420	6	2 0 9.88	1.9244	6 43 40.0	10.174
7	0 31 53.84	1.8598	1 25 38.9	10.429	7	2 2 5.43	1.9273	6 53 49.9	10.154
8	0 33 45.01	1.8530	1 15 13.0	10.437	8	2 4 1.15	1.9302	7 3 58.5	10.133
9	0 35 36.20	1.8533	1 4 46.6	10.444	9	2 5 57.05	1.9332	7 14 5.8	10.111
10	0 37 27.40	1.8536	0 54 19.8	10.451	10	2 7 53.13	1.9362	7 24 11.8	10.088
11	0 39 18.63	1.8540	0 43 52.6	10.457	11	2 9 49.40	1.9393	7 34 16.4	10.065
12	0 41 9.88	1.8544	0 33 25.1	10.463	12	2 11 45.86	1.9425	7 44 19.6	10.041
13	0 43 1.16	1.8549	0 22 57.2	10.468	13	2 13 42.51	1.9457	7 54 21.3	10.016
14	0 44 52.47	1.8554	0 12 29.0	10.473	14	2 15 39.35	1.9490	8 4 21.5	9.991
15	0 46 43.81	1.8560	S. 0° 2' 0.6	10.477	15	2 17 36.39	1.9523	8 14 20.2	9.965
16	0 48 35.19	1.8567	N. 0° 8' 28.0	10.480	16	2 19 33.63	1.9557	8 24 17.3	9.938
17	0 50 26.61	1.8574	0 18 56.9	10.483	17	2 21 31.07	1.9591	8 34 12.7	9.910
18	0 52 18.08	1.8582	0 29 25.9	10.485	18	2 23 28.72	1.9626	8 44 6.4	9.881
19	0 54 9.60	1.8590	0 39 55.0	10.487	19	2 25 26.58	1.9661	8 53 58.4	9.852
20	0 56 1.16	1.8599	0 50 24.2	10.488	20	2 27 24.66	1.9697	9 3 48.6	9.822
21	0 57 52.78	1.8609	1 0 53.5	10.489	21	2 29 22.95	1.9734	9 13 37.1	9.791
22	0 59 44.46	1.8619	1 11 22.8	10.489	22	2 31 21.46	1.9771	9 23 23.7	9.760
23	1 1 36.20	1.8630	1 21 52.1	10.488	23	2 33 20.20	1.9809	9 33 8.3	9.727
	1 3 28.01	1.8641	N. 1° 32' 21.3	10.486		2 35 19.16	1.9847	N. 9° 42' 51.0	9.694
FRIDAY 2.					SUNDAY 4.				
0	1 5 19.90	1.8653	N. 1° 42' 50.4	10.484	0	2 37 18.36	1.9885	N. 9° 52' 31.6	9.660
1	1 7 11.85	1.8665	1 53 19.4	10.489	1	2 39 17.78	1.9924	10 2 10.2	9.636
2	1 9 3.88	1.8678	2 3 48.3	10.490	2	2 41 17.44	1.9963	10 11 46.7	9.591
3	1 10 55.98	1.8691	2 14 17.0	10.477	3	2 43 17.34	2.0003	10 21 21.0	9.554
4	1 12 48.17	1.8705	2 24 45.5	10.473	4	2 45 17.47	2.0043	10 30 53.2	9.516
5	1 14 40.44	1.8720	2 35 13.7	10.468	5	2 47 17.85	2.0083	10 40 23.1	9.478
6	1 16 32.81	1.8735	2 45 41.7	10.463	6	2 49 18.47	2.0124	10 49 50.6	9.439
7	1 18 25.27	1.8751	2 56 9.3	10.457	7	2 51 19.34	2.0166	10 59 15.8	9.400
8	1 20 17.82	1.8767	3 6 36.5	10.451	8	2 53 20.46	2.0208	11 8 38.6	9.359
9	1 22 10.47	1.8784	3 17 3.4	10.444	9	2 55 21.84	2.0251	11 17 58.9	9.318
10	1 24 3.23	1.8802	3 27 29.8	10.436	10	2 57 23.47	2.0294	11 27 16.8	9.276
11	1 25 56.09	1.8820	3 37 55.8	10.428	11	2 59 25.37	2.0338	11 36 32.1	9.233
12	1 27 49.07	1.8839	3 48 21.2	10.419	12	3 1 27.53	2.0382	11 45 44.7	9.189
13	1 29 42.16	1.8858	3 58 46.1	10.410	13	3 3 29.95	2.0427	11 54 54.7	9.144
14	1 31 35.37	1.8878	4 9 10.4	10.400	14	3 5 32.64	2.0472	12 4 2.0	9.098
15	1 33 28.70	1.8898	4 19 34.1	10.390	15	3 7 35.60	2.0517	12 13 6.5	9.051
16	1 35 22.15	1.8919	4 29 57.2	10.379	16	3 9 38.83	2.0562	12 22 8.1	9.003
17	1 37 15.73	1.8941	4 40 19.6	10.367	17	3 11 42.34	2.0608	12 31 6.9	8.955
18	1 39 9.44	1.8963	4 50 41.2	10.354	18	3 13 46.13	2.0654	12 40 2.7	8.905
19	1 41 3.29	1.8986	5 1 2.1	10.341	19	3 15 50.19	2.0701	12 48 55.5	8.855
20	1 42 57.27	1.9009	5 11 22.1	10.327	20	3 17 54.53	2.0748	12 57 45.3	8.804
21	1 44 51.39	1.9033	5 21 41.3	10.313	21	3 19 59.16	2.0795	13 6 32.0	8.752
22	1 46 45.66	1.9057	5 31 59.7	10.298	22	3 22 4.08	2.0843	13 15 15.5	8.699
23	1 48 40.08	1.9082	5 42 17.1	10.283	23	3 24 9.28	2.0891	13 23 55.8	8.645
24	1 50 34.65	1.9108	N. 5° 52' 33.6	10.266	24	3 26 14.77	2.0940	N. 13° 32' 32.9	8.589

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 5.					WEDNESDAY 7.				
0	3 <sup>h</sup> 26 <sup>m</sup> 14.77 <sup>s</sup>	2.0940	N.13° 32' 32.9"	8.589	0	5 <sup>h</sup> 12 <sup>m</sup> 43.77 <sup>s</sup>	2.3440	N.19° 2' 8.8"	4.743
1	3 28 20.56	2.0989	13 41 6.6	8.533	1	5 15 4.56	2.3489	19 6 50.2	4.637
2	3 30 26.64	2.1038	13 49 36.9	8.476	2	5 17 25.64	2.3538	19 11 25.2	4.530
3	3 32 33.02	2.1088	13 58 3.7	8.418	3	5 19 47.02	2.3587	19 15 53.8	4.423
4	3 34 39.69	2.1138	14 6 27.1	8.359	4	5 22 8.69	2.3635	19 20 15.9	4.313
5	3 36 46.66	2.1188	14 14 46.9	8.299	5	5 24 30.65	2.3683	19 24 31.4	4.203
6	3 38 53.94	2.1238	14 23 3.0	8.238	6	5 26 52.90	2.3731	19 28 40.4	4.092
7	3 41 1.52	2.1287	14 31 15.5	8.177	7	5 29 15.43	2.3778	19 32 42.7	3.981
8	3 43 9.40	2.1340	14 39 24.2	8.114	8	5 31 38.24	2.3825	19 36 38.3	3.869
9	3 45 17.59	2.1391	14 47 29.1	8.050	9	5 34 1.33	2.3871	19 40 27.1	3.756
10	3 47 26.09	2.1442	14 55 30.2	7.985	10	5 36 24.70	2.3917	19 44 9.1	3.642
11	3 49 34.90	2.1494	15 3 27.4	7.919	11	5 38 48.33	2.3962	19 47 44.2	3.528
12	3 51 44.02	2.1546	15 11 20.5	7.852	12	5 41 12.23	2.4006	19 51 12.3	3.410
13	3 53 53.45	2.1598	15 19 9.6	7.784	13	5 43 36.40	2.4050	19 54 33.5	3.293
14	3 56 3.20	2.1650	15 26 54.6	7.715	14	5 46 0.83	2.4093	19 57 47.6	3.175
15	3 58 13.26	2.1703	15 34 35.4	7.645	15	5 48 25.52	2.4136	20 0 54.6	3.057
16	4 0 23.64	2.1755	15 42 12.0	7.574	16	5 50 50.46	2.4178	20 3 54.5	2.938
17	4 2 34.33	2.1808	15 49 44.3	7.502	17	5 53 15.65	2.4219	20 6 47.2	2.817
18	4 4 45.33	2.1861	15 57 12.2	7.429	18	5 55 41.09	2.4259	20 9 32.6	2.696
19	4 6 56.65	2.1914	16 4 35.7	7.354	19	5 58 6.76	2.4299	20 12 10.7	2.574
20	4 9 8.29	2.1967	16 11 54.7	7.279	20	6 0 32.67	2.4338	20 14 41.6	2.451
21	4 11 20.26	2.2021	16 19 9.2	7.203	21	6 2 58.82	2.4377	20 17 5.1	2.328
22	4 13 32.54	2.2074	16 26 19.1	7.126	22	6 5 25.20	2.4415	20 19 21.1	2.204
23	4 15 45.15	2.2128	N.16° 33' 24.3"	7.049	23	6 7 51.80	2.4453	N.20° 21' 29.6"	2.079
TUESDAY 6.					THURSDAY 8.				
0	4 17 58.07	2.2181	N.16° 40' 24.8"	6.969	0	6 10 18.63	2.4490	N.20° 23' 30.6"	1.963
1	4 20 11.32	2.2234	16 47 20.5	6.888	1	6 12 45.67	2.4525	20 25 24.0	1.827
2	4 22 24.88	2.2287	16 54 11.3	6.806	2	6 15 12.92	2.4560	20 27 9.9	1.700
3	4 24 38.77	2.2341	17 0 57.1	6.723	3	6 17 40.38	2.4594	20 28 48.1	1.573
4	4 26 52.97	2.2394	17 7 38.0	6.639	4	6 20 8.04	2.4627	20 30 18.6	1.445
5	4 29 7.50	2.2448	17 14 13.8	6.554	5	6 22 35.90	2.4660	20 31 41.4	1.316
6	4 31 22.34	2.2501	17 20 44.5	6.468	6	6 25 3.95	2.4692	20 32 56.5	1.186
7	4 33 37.51	2.2555	17 27 10.0	6.382	7	6 27 32.20	2.4723	20 34 3.8	1.056
8	4 35 53.00	2.2608	17 33 30.3	6.294	8	6 30 0.63	2.4753	20 35 3.2	0.925
9	4 38 8.81	2.2662	17 39 45.3	6.204	9	6 32 29.23	2.4781	20 35 54.8	0.794
10	4 40 24.94	2.2715	17 45 54.8	6.114	10	6 34 57.99	2.4808	20 36 38.5	0.663
11	4 42 41.39	2.2768	17 51 58.9	6.023	11	6 37 26.92	2.4835	20 37 14.3	0.531
12	4 44 58.16	2.2821	17 57 57.5	5.931	12	6 39 56.01	2.4861	20 37 42.2	0.398
13	4 47 15.24	2.2873	18 3 50.6	5.838	13	6 42 25.25	2.4886	20 38 2.1	0.265
14	4 49 32.64	2.2926	18 9 38.0	5.744	14	6 44 54.65	2.4911	20 38 14.0	0.131
15	4 51 50.36	2.2978	18 15 19.7	5.648	15	6 47 24.19	2.4935	20 38 17.9	0.003
16	4 54 8.39	2.3031	18 20 55.7	5.551	16	6 49 53.87	2.4958	20 38 13.7	0.137
17	4 56 26.74	2.3083	18 26 25.9	5.453	17	6 52 23.69	2.4980	20 38 1.4	0.272
18	4 58 45.39	2.3135	18 31 50.1	5.355	18	6 54 53.63	2.5001	20 37 41.1	0.407
19	5 1 4.36	2.3187	18 37 8.4	5.256	19	6 57 23.69	2.5020	20 37 12.7	0.542
20	5 3 23.63	2.3238	18 42 20.8	5.155	20	6 59 53.86	2.5038	20 36 36.1	0.677
21	5 5 43.21	2.3289	18 47 27.1	5.053	21	7 2 24.14	2.5056	20 35 51.4	0.813
22	5 8 3.09	2.3340	18 52 27.2	4.950	22	7 4 54.53	2.5073	20 34 58.5	0.949
23	5 10 23.28	2.3390	18 57 21.1	4.847	23	7 7 25.01	2.5088	20 33 57.5	1.085
24	5 12 43.77	2.3440	N.19° 2' 8.8"	4.743	24	7 9 55.59	2.5103	N.20° 32' 48.3"	1.221

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 9.					SUNDAY 11.				
0	7 9 55.59	2.5103	N.20° 32' 48.3"	1.221	0	9 10 18.40	2.4794	N.17° 0' 12.2"	7.452
1	7 12 26.25	2.5117	20 31 31.0	1.358	1	9 12 46.67	2.4696	16 52 41.6	7.566
2	7 14 56.99	2.5130	20 30 5.4	1.485	2	9 15 14.78	2.4672	16 45 4.3	7.678
3	7 17 27.81	2.5142	20 28 31.6	1.632	3	9 17 42.72	2.4645	16 37 20.3	7.789
4	7 19 58.69	2.5152	20 26 49.6	1.769	4	9 20 10.50	2.4617	16 29 29.6	7.899
5	7 22 29.64	2.5161	20 24 59.4	1.905	5	9 22 38.11	2.4589	16 21 32.4	8.008
6	7 25 0.64	2.5170	20 23 1.0	2.042	6	9 25 5.55	2.4560	16 13 28.7	8.116
7	7 27 31.69	2.5178	20 20 54.4	2.178	7	9 27 32.82	2.4531	16 5 18.6	8.223
8	7 30 2.78	2.5185	20 18 30.6	2.315	8	9 29 59.91	2.4501	15 57 2.0	8.329
9	7 32 33.92	2.5191	20 16 16.6	2.452	9	9 32 26.82	2.4471	15 48 39.1	8.433
10	7 35 5.09	2.5195	20 13 45.4	2.589	10	9 34 53.54	2.4441	15 40 10.0	8.536
11	7 37 36.28	2.5199	20 11 6.0	2.725	11	9 37 20.08	2.4410	15 31 34.8	8.638
12	7 40 7.49	2.5202	20 8 18.4	2.861	12	9 39 46.45	2.4379	15 22 53.4	8.739
13	7 42 38.72	2.5204	20 5 22.7	2.997	13	9 42 12.62	2.4348	15 14 6.0	8.839
14	7 45 9.95	2.5205	20 2 18.8	3.133	14	9 44 38.61	2.4317	15 5 12.7	8.938
15	7 47 41.19	2.5205	19 59 6.7	3.269	15	9 47 4.41	2.4285	14 56 13.5	9.035
16	7 50 12.42	2.5204	19 55 46.5	3.405	16	9 49 30.01	2.4253	14 47 8.5	9.131
17	7 52 43.65	2.5202	19 52 18.2	3.540	17	9 51 55.42	2.4220	14 37 57.7	9.227
18	7 55 14.86	2.5199	19 48 41.7	3.675	18	9 54 20.64	2.4187	14 28 41.3	9.321
19	7 57 46.05	2.5195	19 44 57.2	3.809	19	9 56 45.66	2.4154	14 19 19.3	9.413
20	8 0 17.21	2.5190	19 41 4.6	3.943	20	9 59 10.49	2.4121	14 9 51.8	9.504
21	8 2 48.34	2.5185	19 37 3.9	4.077	21	10 1 35.12	2.4088	14 0 18.9	9.593
22	8 5 19.44	2.5179	19 32 55.3	4.210	22	10 3 59.55	2.4055	13 50 40.6	9.681
23	8 7 50.49	2.5171	N.19° 28' 38.7"	4.343	23	10 6 23.78	2.4022	N.13° 40' 57.1"	9.768
SATURDAY 10.					MONDAY 12.				
0	8 10 21.50	2.5182	N.19° 24' 14.1"	4.475	0	10 8 47.81	2.3989	N.13° 31' 8.4"	9.854
1	8 12 52.45	2.5153	19 19 41.6	4.607	1	10 11 11.64	2.3955	13 21 14.6	9.930
2	8 15 23.34	2.5143	19 15 1.2	4.739	2	10 13 35.27	2.3922	13 11 15.7	10.023
3	8 17 54.17	2.5132	19 10 12.9	4.870	3	10 15 58.70	2.3888	13 1 11.8	10.105
4	8 20 24.93	2.5120	19 5 16.8	5.000	4	10 18 21.92	2.3854	12 51 3.1	10.186
5	8 22 55.62	2.5107	19 0 12.9	5.130	5	10 20 44.94	2.3820	12 40 49.6	10.265
6	8 25 26.23	2.5093	18 55 1.2	5.259	6	10 23 7.76	2.3787	12 30 31.3	10.343
7	8 27 56.75	2.5079	18 49 41.8	5.388	7	10 25 30.38	2.3753	12 20 8.4	10.420
8	8 30 27.18	2.5064	18 44 14.7	5.516	8	10 27 52.79	2.3720	12 9 40.9	10.495
9	8 32 57.52	2.5047	18 38 40.0	5.643	9	10 30 15.01	2.3686	11 59 8.9	10.569
10	8 35 27.76	2.5030	18 32 57.6	5.769	10	10 32 37.02	2.3652	11 48 32.6	10.642
11	8 37 57.89	2.5012	18 27 7.7	5.895	11	10 34 58.83	2.3619	11 37 52.0	10.713
12	8 40 27.92	2.4994	18 21 10.2	6.020	12	10 37 20.44	2.3585	11 27 7.1	10.783
13	8 42 57.84	2.4975	18 15 5.2	6.144	13	10 39 41.85	2.3552	11 16 18.0	10.852
14	8 45 27.65	2.4956	18 8 52.9	6.267	14	10 42 3.06	2.3519	11 5 24.9	10.919
15	8 47 57.33	2.4936	18 2 33.2	6.390	15	10 44 24.07	2.3486	10 54 27.8	10.984
16	8 50 26.89	2.4915	17 56 6.1	6.512	16	10 46 44.89	2.3453	10 43 26.8	11.049
17	8 52 56.32	2.4894	17 49 31.8	6.633	17	10 49 5.51	2.3421	10 32 22.0	11.112
18	8 55 25.62	2.4872	17 42 50.2	6.753	18	10 51 25.94	2.3388	10 21 13.4	11.173
19	8 57 54.78	2.4848	17 36 1.5	6.872	19	10 53 46.17	2.3356	10 10 1.2	11.233
20	9 0 23.80	2.4824	17 29 5.6	6.990	20	10 56 6.21	2.3324	9 58 45.4	11.292
21	9 2 52.68	2.4799	17 22 2.7	7.107	21	10 58 26.05	2.3292	9 47 26.1	11.350
22	9 5 21.41	2.4774	17 14 52.8	7.223	22	11 0 45.70	2.3260	9 36 3.4	11.406
23	9 7 49.99	2.4749	17 7 36.0	7.338	23	11 3 5.16	2.3228	9 24 37.4	11.461
24	9 10 18.40	2.4724	N.17° 0' 12.2"	7.452	24	11 5 24.43	2.3196	N. 9° 13' 8.1"	11.514

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 13.					THURSDAY 15.				
0	11 <sup>h</sup> 5 <sup>m</sup> 24.43	2.3196	N. 9° 13' 8.1"	11.514	0	12 <sup>h</sup> 53 <sup>m</sup> 49.87	2.2148	S. 0° 35' 14.9"	12.497
1	11 7 43.51	2.3165	9 1 35.7	11.566	1	12 56 2.73	2.2138	0 47 44.4	12.487
2	11 10 2.41	2.3134	8 50 0.2	11.617	2	12 58 15.53	2.2129	1 0 13.3	12.475
3	11 12 21.13	2.3104	8 38 21.7	11.668	3	13 0 28.28	2.2120	1 12 41.4	12.462
4	11 14 39.66	2.3074	8 26 40.3	11.714	4	13 2 40.97	2.2111	1 25 8.7	12.448
5	11 16 58.02	2.3045	8 14 56.1	11.760	5	13 4 53.61	2.2103	1 37 35.1	12.432
6	11 19 16.20	2.3015	8 3 9.1	11.805	6	13 7 6.20	2.2095	1 50 0.5	12.415
7	11 21 34.20	2.2986	7 51 19.4	11.849	7	13 9 18.75	2.2086	2 2 24.8	12.397
8	11 23 52.03	2.2957	7 39 27.2	11.892	8	13 11 31.26	2.2081	2 14 48.1	12.378
9	11 26 9.69	2.2928	7 27 32.5	11.933	9	13 13 43.72	2.2074	2 27 10.2	12.358
10	11 28 27.17	2.2900	7 15 35.3	11.979	10	13 15 56.15	2.2068	2 39 31.0	12.337
11	11 30 44.48	2.2872	7 3 35.8	12.010	11	13 18 8.54	2.2063	2 51 50.5	12.314
12	11 33 1.63	2.2845	6 51 34.1	12.047	12	13 20 20.91	2.2059	3 4 8.7	12.290
13	11 35 18.62	2.2818	6 39 30.2	12.082	13	13 22 33.25	2.2055	3 16 25.4	12.266
14	11 37 35.44	2.2791	6 27 24.2	12.116	14	13 24 45.57	2.2051	3 28 40.6	12.240
15	11 39 52.10	2.2764	6 15 16.2	12.149	15	13 26 57.86	2.2048	3 40 54.2	12.213
16	11 42 8.61	2.2738	6 3 6.3	12.181	16	13 29 10.14	2.2045	3 53 6.1	12.185
17	11 44 24.96	2.2713	5 50 54.6	12.211	17	13 31 22.40	2.2042	4 5 16.3	12.155
18	11 46 41.16	2.2688	5 38 41.0	12.240	18	13 33 34.64	2.2040	4 17 24.7	12.124
19	11 48 57.21	2.2663	5 26 25.7	12.268	19	13 35 46.87	2.2038	4 29 31.2	12.093
20	11 51 13.11	2.2639	5 14 8.9	12.294	20	13 37 59.10	2.2036	4 41 35.8	12.061
21	11 53 28.87	2.2615	5 1 50.6	12.318	21	13 40 11.33	2.2038	4 53 38.4	12.027
22	11 55 44.48	2.2591	4 49 30.8	12.341	22	13 42 23.56	2.2038	5 5 39.0	11.992
23	11 57 59.96	2.2568	N. 4 37 9.6	12.363	23	13 44 35.79	2.2039	S. 5 17 37.4	11.956
WEDNESDAY 14.					FRIDAY 16.				
0	12 0 15.30	2.2545	N. 4 24 47.2	12.384	0	13 46 48.03	2.2040	S. 5 29 33.7	11.919
1	12 2 30.51	2.2523	4 12 23.6	12.403	1	13 49 0.28	2.2042	5 41 27.7	11.881
2	12 4 45.58	2.2501	3 59 58.8	12.421	2	13 51 12.53	2.2043	5 53 19.4	11.842
3	12 7 0.53	2.2480	3 47 33.0	12.438	3	13 53 24.79	2.2045	6 5 8.7	11.801
4	12 9 15.35	2.2460	3 35 6.2	12.454	4	13 55 37.07	2.2047	6 16 55.5	11.759
5	12 11 30.05	2.2440	3 22 38.5	12.468	5	13 57 49.36	2.2050	6 28 39.8	11.717
6	12 13 44.63	2.2420	3 10 10.0	12.481	6	14 0 1.67	2.2054	6 40 21.6	11.674
7	12 15 59.09	2.2401	2 57 40.8	12.493	7	14 2 14.01	2.2058	6 52 0.7	11.629
8	12 18 13.44	2.2382	2 45 10.9	12.503	8	14 4 26.37	2.2063	7 3 37.1	11.583
9	12 20 27.68	2.2364	2 32 40.5	12.512	9	14 6 38.76	2.2068	7 15 10.8	11.537
10	12 22 41.81	2.2346	2 20 9.5	12.520	10	14 8 51.19	2.2073	7 26 41.6	11.490
11	12 24 55.83	2.2329	2 7 38.1	12.527	11	14 11 3.65	2.2079	7 38 9.5	11.441
12	12 27 9.75	2.2312	1 55 6.3	12.532	12	14 13 16.14	2.2085	7 49 34.5	11.391
13	12 29 23.57	2.2295	1 42 34.3	12.538	13	14 15 28.67	2.2091	8 0 56.5	11.341
14	12 31 37.29	2.2279	1 30 2.0	12.539	14	14 17 41.23	2.2098	8 12 15.4	11.289
15	12 33 50.92	2.2264	1 17 29.6	12.540	15	14 19 53.84	2.2105	8 23 31.1	11.236
16	12 36 4.46	2.2249	1 4 57.2	12.540	16	14 22 6.49	2.2113	8 34 43.7	11.182
17	12 38 17.91	2.2235	0 52 24.9	12.538	17	14 24 19.19	2.2121	8 45 53.0	11.127
18	12 40 31.28	2.2221	0 39 52.6	12.536	18	14 26 31.94	2.2129	8 56 59.0	11.071
19	12 42 44.56	2.2208	0 27 20.5	12.533	19	14 28 44.74	2.2138	9 8 1.6	11.015
20	12 44 57.77	2.2195	0 14 48.6	12.529	20	14 30 57.59	2.2146	9 19 0.8	10.958
21	12 47 10.90	2.2183	N. 0 2 17.1	12.523	21	14 33 10.49	2.2155	9 29 56.5	10.899
22	12 49 23.96	2.2171	S. 0 10 14.1	12.516	22	14 35 23.45	2.2164	9 40 48.7	10.839
23	12 51 36.95	2.2159	0 22 44.8	12.507	23	14 37 36.46	2.2174	9 51 37.3	10.778
24	12 53 49.87	2.2148	S. 0 35 14.9	12.497	24	14 39 49.53	2.2184	S. 10 2 22.1	10.716

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 17.					MONDAY 19.				
0	14 39 49.53	2.2184	S. 10° 2' 22.1"	10.716	0	16 27 49.60	2.2836	S. 17° 8' 51.5"	6.744
1	14 42 2.67	2.2195	10 13 3.2	10.654	1	16 30 6.65	2.2848	17 15 33.1	6.643
2	14 44 15.87	2.2206	10 23 40.6	10.591	2	16 32 23.78	2.2861	17 22 8.7	6.542
3	14 46 29.14	2.2217	10 34 14.1	10.527	3	16 34 40.98	2.2873	17 28 38.2	6.441
4	14 48 42.48	2.2228	10 44 43.8	10.461	4	16 36 58.26	2.2885	17 35 1.6	6.338
5	14 50 55.88	2.2239	10 55 9.5	10.394	5	16 39 15.61	2.2897	17 41 18.8	6.234
6	14 53 9.35	2.2251	11 5 31.1	10.326	6	16 41 33.02	2.2908	17 47 29.7	6.131
7	14 55 22.89	2.2263	11 15 48.7	10.258	7	16 43 50.50	2.2919	17 53 34.4	6.027
8	14 57 36.51	2.2275	11 26 2.1	10.189	8	16 46 8.04	2.2930	17 59 32.9	5.922
9	14 59 50.20	2.2288	11 36 11.4	10.120	9	16 48 25.65	2.2940	18 5 25.1	5.817
10	15 2 3.97	2.2301	11 46 16.5	10.049	10	16 50 43.32	2.2950	18 11 10.9	5.711
11	15 4 17.81	2.2314	11 56 17.3	9.977	11	16 53 1.05	2.2960	18 16 50.4	5.605
12	15 6 31.73	2.2327	12 6 13.7	9.904	12	16 55 18.84	2.2970	18 22 23.5	5.499
13	15 8 45.73	2.2340	12 16 5.7	9.830	13	16 57 36.69	2.2979	18 27 50.2	5.392
14	15 10 59.81	2.2353	12 25 53.3	9.755	14	16 59 54.59	2.2988	18 33 10.5	5.284
15	15 13 13.97	2.2367	12 35 36.4	9.680	15	17 2 12.54	2.2996	18 38 24.3	5.176
16	15 15 28.21	2.2381	12 45 14.9	9.604	16	17 4 30.53	2.3004	18 43 31.6	5.067
17	15 17 42.54	2.2395	12 54 48.8	9.527	17	17 6 48.57	2.3011	18 48 32.4	4.956
18	15 19 56.95	2.2409	13 4 18.1	9.448	18	17 9 6.66	2.3018	18 53 26.6	4.849
19	15 22 11.44	2.2423	13 13 42.6	9.369	19	17 11 24.79	2.3025	18 58 14.3	4.740
20	15 24 26.02	2.2437	13 23 2.4	9.290	20	17 13 42.96	2.3032	19 2 55.4	4.630
21	15 26 40.69	2.2452	13 32 17.4	9.210	21	17 16 1.17	2.3038	19 7 29.9	4.520
22	15 28 55.44	2.2466	13 41 27.6	9.129	22	17 18 19.41	2.3043	19 11 57.8	4.409
23	15 31 10.28	2.2481	S. 13 50 32.9	9.046	23	17 20 37.68	2.3048	S. 19 16 19.0	4.298
SUNDAY 18.					TUESDAY 20.				
0	15 33 25.21	2.2495	S. 13 50 33.1	8.963	0	17 22 55.97	2.3053	S. 19 20 33.5	4.187
1	15 35 40.23	2.2510	14 8 28.3	8.878	1	17 25 14.30	2.3067	19 24 41.3	4.075
2	15 37 55.33	2.2524	14 17 18.5	8.794	2	17 27 32.65	2.3080	19 28 42.5	3.963
3	15 40 10.52	2.2539	14 26 3.6	8.709	3	17 29 51.02	2.3093	19 32 36.9	3.851
4	15 42 25.80	2.2553	14 34 43.6	8.623	4	17 32 9.41	2.3096	19 36 24.6	3.739
5	15 44 41.17	2.2568	14 43 18.3	8.535	5	17 34 27.81	2.3098	19 40 5.5	3.626
6	15 46 56.62	2.2583	14 51 47.8	8.447	6	17 36 46.23	2.3070	19 43 39.7	3.513
7	15 49 12.16	2.2598	15 0 12.0	8.359	7	17 39 4.66	2.3072	19 47 7.1	3.400
8	15 51 27.79	2.2612	15 8 30.9	8.270	8	17 41 23.09	2.3072	19 50 27.7	3.287
9	15 53 43.51	2.2627	15 16 44.4	8.179	9	17 43 41.52	2.3072	19 53 41.5	3.173
10	15 55 59.32	2.2642	15 24 52.4	8.088	10	17 45 59.95	2.3072	19 56 48.5	3.060
11	15 58 15.22	2.2657	15 32 55.0	7.997	11	17 48 18.38	2.3071	19 59 48.7	2.946
12	16 0 31.20	2.2672	15 40 52.0	7.905	12	17 50 36.80	2.3070	20 2 42.0	2.832
13	16 2 47.27	2.2686	15 48 43.5	7.812	13	17 52 55.21	2.3068	20 5 28.5	2.718
14	16 5 3.43	2.2700	15 56 29.4	7.718	14	17 55 13.61	2.3066	20 8 8.1	2.604
15	16 7 19.67	2.2714	16 4 9.7	7.624	15	17 57 31.99	2.3063	20 10 40.9	2.489
16	16 9 36.00	2.2729	16 11 44.3	7.529	16	17 59 50.36	2.3059	20 13 6.8	2.375
17	16 11 52.41	2.2743	16 19 13.1	7.433	17	18 2 8.70	2.3055	20 15 25.9	2.261
18	16 14 8.91	2.2757	16 26 36.2	7.336	18	4 27.02	2.3050	20 17 38.1	2.147
19	16 16 25.49	2.2770	16 33 53.5	7.239	19	18 6 45.31	2.3045	20 19 43.4	2.032
20	16 18 42.15	2.2784	16 41 4.9	7.141	20	18 9 3.56	2.3039	20 21 41.9	1.918
21	16 20 58.89	2.2797	16 48 10.4	7.043	21	18 11 21.78	2.3033	20 23 33.5	1.803
22	16 23 15.71	2.2810	16 55 10.1	6.944	22	18 13 39.96	2.3026	20 25 18.2	1.688
23	16 25 32.61	2.2823	17 2 3.8	6.845	23	18 15 58.09	2.3019	20 26 56.0	1.573
24	16 27 49.60	2.2836	S. 17 8 51.5	6.744	24	18 18 16.18	2.3011	S. 20 28 27.0	1.458



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 21.					FRIDAY 23.				
0	18 18 16.18	2.3011	S. 20° 28' 27.0"	1.458	0	20 6 44.56	2.1994	S. 19° 30' 32.5"	3.730
1	18 20 34.22	2.3002	20 29 51.1	1.344	1	20 8 56.43	2.1962	19 26 45.8	3.827
2	18 22 52.20	2.2993	20 31 8.3	1.230	2	20 11 8.10	2.1930	19 22 53.3	3.922
3	18 25 10.13	2.2983	20 32 18.7	1.116	3	20 13 19.57	2.1897	19 18 55.1	4.017
4	18 27 28.00	2.2973	20 33 22.2	1.001	4	20 15 30.85	2.1864	19 14 51.2	4.112
5	18 29 45.81	2.2962	20 34 18.9	0.887	5	20 17 41.93	2.1830	19 10 41.6	4.206
6	18 32 3.55	2.2951	20 35 8.7	0.773	6	20 19 52.81	2.1796	19 6 26.4	4.299
7	18 34 21.22	2.2939	20 35 51.7	0.659	7	20 22 3.48	2.1762	19 2 5.6	4.392
8	18 36 38.82	2.2926	20 36 27.8	0.545	8	20 24 13.95	2.1728	18 57 39.2	4.484
9	18 38 56.33	2.2913	20 36 57.1	0.432	9	20 26 24.22	2.1694	18 53 7.3	4.576
10	18 40 13.76	2.2899	20 37 19.6	0.319	10	20 28 34.28	2.1660	18 48 30.0	4.667
11	18 43 31.11	2.2884	20 37 35.3	0.206	11	20 30 44.14	2.1625	18 43 47.3	4.757
12	18 45 48.37	2.2869	20 37 44.3	0.093	12	20 32 53.79	2.1590	18 38 59.1	4.847
13	18 48 5.54	2.2854	20 37 46.5	0.080	13	20 35 3.23	2.1555	18 34 5.6	4.936
14	18 50 22.62	2.2838	20 37 41.9	0.133	14	20 37 12.46	2.1520	18 29 6.7	5.024
15	18 52 39.60	2.2821	20 37 30.6	0.245	15	20 39 21.47	2.1484	18 24 2.6	5.111
16	18 54 56.47	2.2804	20 37 12.5	0.357	16	20 41 30.26	2.1448	18 18 53.3	5.197
17	18 57 13.24	2.2786	20 36 47.7	0.463	17	20 43 38.84	2.1412	18 13 38.8	5.283
18	18 59 29.90	2.2768	20 36 16.2	0.581	18	20 45 47.20	2.1376	18 8 19.2	5.368
19	19 1 46.46	2.2749	20 35 38.0	0.693	19	20 47 55.35	2.1340	18 2 54.5	5.453
20	19 4 2.90	2.2730	20 34 53.2	0.803	20	20 50 3.28	2.1304	17 57 24.7	5.537
21	19 6 19.22	2.2710	20 34 1.7	0.913	21	20 52 10.99	2.1267	17 51 49.9	5.620
22	19 8 35.42	2.2690	20 33 3.6	1.023	22	20 54 18.48	2.1231	17 46 10.2	5.702
23	19 10 51.49	2.2669	S. 20 31 58.9	1.133	23	20 56 25.76	2.1194	S. 17 40 25.6	5.784
THURSDAY 22.					SATURDAY 24.				
0	19 13 7.44	2.2647	S. 20 30 47.7	1.243	0	20 58 32.82	2.1158	S. 17 34 36.1	5.865
1	19 15 23.26	2.2625	20 29 29.9	1.359	1	21 0 39.65	2.1121	17 28 41.8	5.946
2	19 17 38.94	2.2602	20 28 5.5	1.480	2	21 2 46.27	2.1084	17 22 42.6	6.025
3	19 19 54.48	2.2579	20 26 34.6	1.568	3	21 4 52.67	2.1047	17 16 38.7	6.103
4	19 22 9.89	2.2556	20 24 57.3	1.676	4	21 6 58.84	2.1010	17 10 30.2	6.181
5	19 24 25.16	2.2532	20 23 13.5	1.783	5	21 9 4.79	2.0973	17 4 17.0	6.258
6	19 26 40.29	2.2508	20 21 23.3	1.890	6	21 11 10.52	2.0936	16 57 59.2	6.334
7	19 28 55.27	2.2483	20 19 26.7	1.997	7	21 13 16.03	2.0899	16 51 36.8	6.410
8	19 31 10.10	2.2457	20 17 23.6	2.103	8	21 15 21.32	2.0862	16 45 10.0	6.485
9	19 33 24.76	2.2431	20 15 14.2	2.209	9	21 17 26.38	2.0826	16 38 38.7	6.559
10	19 35 39.27	2.2405	20 12 58.5	2.314	10	21 19 31.22	2.0789	16 32 2.9	6.632
11	19 37 53.62	2.2378	20 10 36.5	2.418	11	21 21 35.84	2.0753	16 25 22.7	6.705
12	19 40 7.81	2.2351	20 8 8.3	2.523	12	21 23 40.25	2.0716	16 18 38.3	6.777
13	19 42 21.84	2.2324	20 5 33.8	2.627	13	21 25 44.44	2.0679	16 11 49.6	6.848
14	19 44 35.70	2.2296	20 2 53.1	2.730	14	21 27 48.40	2.0642	16 4 56.6	6.918
15	19 46 49.39	2.2268	20 0 6.2	2.832	15	21 29 52.14	2.0605	15 57 59.4	6.988
16	19 49 2.91	2.2239	19 57 13.2	2.934	16	21 31 55.66	2.0568	15 50 58.1	7.057
17	19 51 16.25	2.2209	19 54 14.1	3.035	17	21 33 58.96	2.0532	15 43 52.6	7.125
18	19 53 29.41	2.2179	19 51 9.0	3.136	18	21 36 2.04	2.0495	15 36 43.1	7.192
19	19 55 42.39	2.2148	19 47 57.8	3.237	19	21 38 4.90	2.0459	15 29 29.6	7.258
20	19 57 55.19	2.2118	19 44 40.6	3.337	20	21 40 7.55	2.0423	15 22 12.1	7.324
21	20 0 7.81	2.2087	19 41 17.4	3.436	21	21 42 9.98	2.0387	15 14 50.7	7.389
22	20 2 20.25	2.2056	19 37 48.3	3.534	22	21 44 12.20	2.0351	15 7 25.4	7.453
23	20 4 32.50	2.2025	19 34 13.3	3.632	23	21 46 14.20	2.0316	14 59 56.3	7.517
24	20 6 44.56	2.1994	S. 19 30 32.5	3.730	24	21 48 15.99	2.0281	S. 14 52 23.4	7.579

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 25.					TUESDAY 27.				
0	21 <sup>h</sup> 48 <sup>m</sup> 15.99	2.0281	S. 14° 52' 23.4"	7.579	0	23 <sup>h</sup> 21 <sup>m</sup> 58.06	1.8885	S. 7° 50' 17.2"	9.738
1	21 50 17.57	2.0245	14 44 46.8	7.641	1	23 23 51.31	1.8865	7 40 32.1	9.766
2	21 52 18.93	2.0210	14 37 6.5	7.702	2	23 25 44.44	1.8845	7 30 45.3	9.794
3	21 54 20.08	2.0174	14 29 22.5	7.763	3	23 27 37.46	1.8826	7 20 56.9	9.821
4	21 56 21.02	2.0138	14 21 34.9	7.823	4	23 29 30.36	1.8808	7 11 6.8	9.847
5	21 58 21.74	2.0103	14 13 43.8	7.882	5	23 31 23.15	1.8790	7 1 15.2	9.873
6	22 0 22.26	2.0069	14 5 49.1	7.940	6	23 33 15.84	1.8772	6 51 22.0	9.898
7	22 2 22.57	2.0035	13 57 50.9	7.998	7	23 35 8.42	1.8755	6 41 27.3	9.923
8	22 4 22.68	2.0001	13 49 49.4	8.054	8	23 37 0.89	1.8738	6 31 31.2	9.947
9	22 6 22.59	1.9968	13 41 44.5	8.109	9	23 38 53.26	1.8721	6 21 33.7	9.970
10	22 8 22.30	1.9934	13 33 36.3	8.164	10	23 40 45.54	1.8705	6 11 34.8	9.993
11	22 10 21.80	1.9901	13 25 24.8	8.219	11	23 42 37.72	1.8689	6 1 34.5	10.015
12	22 12 21.10	1.9867	13 17 10.0	8.273	12	23 44 29.81	1.8674	5 51 33.0	10.037
13	22 14 20.20	1.9834	13 8 52.0	8.327	13	23 46 21.81	1.8660	5 41 30.2	10.058
14	22 16 19.11	1.9801	13 0 30.8	8.379	14	23 48 13.73	1.8646	5 31 26.1	10.078
15	22 18 17.82	1.9769	12 52 6.5	8.430	15	23 50 5.57	1.8633	5 21 20.8	10.098
16	22 20 16.34	1.9737	12 43 39.2	8.481	16	23 51 57.32	1.8620	5 11 14.4	10.117
17	22 22 14.67	1.9705	12 35 8.8	8.531	17	23 53 48.99	1.8607	5 1 6.9	10.135
18	22 24 12.80	1.9674	12 26 35.5	8.580	18	23 55 40.59	1.8595	4 50 58.2	10.153
19	22 26 10.75	1.9643	12 17 59.2	8.629	19	23 57 32.12	1.8583	4 40 48.4	10.171
20	22 28 8.51	1.9611	12 9 20.0	8.677	20	23 59 23.58	1.8572	4 30 37.7	10.187
21	22 30 6.08	1.9580	12 0 38.0	8.724	21	0 1 14.98	1.8561	4 20 26.0	10.203
22	22 32 3.47	1.9549	11 51 53.1	8.770	22	0 3 6.31	1.8551	4 10 13.3	10.219
23	22 34 0.68	1.9519	S. 11° 43' 5.5"	8.816	23	0 4 57.59	1.8542	S. 3° 59' 59.7"	10.234
MONDAY 26.					WEDNESDAY 28.				
0	22 35 57.71	1.9489	S. 11° 34' 15.2"	8.861	0	0 6 48.81	1.8533	S. 3° 49' 45.2"	10.248
1	22 37 54.55	1.9460	11 25 22.2	8.906	1	0 8 39.98	1.8524	3 39 29.8	10.263
2	22 39 51.22	1.9431	11 16 26.5	8.949	2	0 10 31.09	1.8516	3 29 13.7	10.275
3	22 41 47.72	1.9403	11 7 28.2	8.992	3	0 12 22.16	1.8508	3 18 56.8	10.288
4	22 43 44.05	1.9375	10 58 27.4	9.034	4	0 14 13.18	1.8501	3 8 39.1	10.300
5	22 45 40.21	1.9347	10 49 24.1	9.076	5	0 16 4.16	1.8494	2 58 20.7	10.312
6	22 47 36.21	1.9319	10 40 18.3	9.117	6	0 17 55.10	1.8488	2 48 1.7	10.323
7	22 49 32.04	1.9292	10 31 10.0	9.158	7	0 19 46.01	1.8483	2 37 42.0	10.333
8	22 51 27.71	1.9265	10 21 59.4	9.197	8	0 21 36.89	1.8478	2 27 21.7	10.343
9	22 53 23.21	1.9238	10 12 46.4	9.235	9	0 23 27.74	1.8473	2 17 0.8	10.352
10	22 55 18.55	1.9212	10 3 31.2	9.273	10	0 25 18.56	1.8469	2 6 39.4	10.361
11	22 57 13.74	1.9186	9 54 13.7	9.311	11	0 27 9.36	1.8465	1 56 17.5	10.369
12	22 59 8.78	1.9160	9 44 53.9	9.348	12	0 29 0.13	1.8462	1 45 55.1	10.377
13	23 1 3.66	1.9135	9 35 31.9	9.384	13	0 30 50.89	1.8459	1 35 32.3	10.384
14	23 2 58.39	1.9110	9 26 7.8	9.419	14	0 32 41.64	1.8457	1 25 9.0	10.390
15	23 4 52.98	1.9086	9 16 41.6	9.454	15	0 34 32.38	1.8456	1 14 45.4	10.396
16	23 6 47.42	1.9062	9 7 13.3	9.488	16	0 36 23.11	1.8455	1 4 21.5	10.401
17	23 8 41.72	1.9039	8 57 43.0	9.522	17	0 38 13.84	1.8455	0 53 57.3	10.406
18	23 10 35.89	1.9016	8 48 10.6	9.555	18	0 40 4.57	1.8455	0 43 32.8	10.410
19	23 12 29.92	1.8993	8 38 36.3	9.587	19	0 41 55.30	1.8456	0 33 8.1	10.414
20	23 14 23.81	1.8971	8 29 0.2	9.618	20	0 43 46.03	1.8457	0 22 43.1	10.417
21	23 16 17.57	1.8949	8 19 22.2	9.649	21	0 45 36.78	1.8459	0 12 17.9	10.420
22	23 18 11.19	1.8927	8 9 42.3	9.679	22	0 47 27.54	1.8462	S. 0° 1' 52.7"	10.422
23	23 20 4.69	1.8906	8 0 0.6	9.709	23	0 49 18.32	1.8466	N. 0° 8' 32.6"	10.423
24	23 21 58.06	1.8885	S. 7° 50' 17.2"	9.738	24	0 51 9.13	1.8470	N. 0° 18' 58.0"	10.424

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.				
THURSDAY 29.					SATURDAY 31.								
0	<sup>h</sup> 0 <sup>m</sup> 51 <sup>s</sup> 9.13	1.8470	N. 0° 18' 58.0"	10.494	0	<sup>h</sup> 2 <sup>m</sup> 21 <sup>s</sup> 15.43	1.9220	N. 8° 29' 20.7"	9.778				
1	0 52 59.95	1.8474	0 29 23.5	10.494	1	2 23 11.26	1.9321	8 39 6.5	9.749				
2	0 54 50.80	1.8479	0 39 48.9	10.494	2	2 25 7.27	1.9352	8 48 50.6	9.719				
3	0 56 41.68	1.8484	0 50 14.3	10.493	3	2 27 3.47	1.9384	8 58 32.9	9.689				
4	0 58 32.59	1.8489	1 0 39.7	10.491	4	2 28 59.87	1.9416	9 8 13.3	9.658				
5	1 0 23.54	1.8495	1 11 4.9	10.419	5	2 30 56.46	1.9449	9 17 51.9	9.627				
6	1 2 14.52	1.8502	1 21 30.0	10.416	6	2 32 53.25	1.9489	9 27 28.6	9.595				
7	1 4 5.55	1.8509	1 31 54.9	10.413	7	2 34 50.25	1.9516	9 37 3.3	9.562				
8	1 5 56.62	1.8517	1 42 19.6	10.410	8	2 36 47.46	1.9550	9 46 36.0	9.528				
9	1 7 47.74	1.8525	1 52 44.1	10.406	9	2 38 44.86	1.9585	9 56 6.7	9.494				
10	1 9 38.91	1.8534	2 3 8.3	10.401	10	2 40 42.47	1.9621	10 5 35.3	9.459				
11	1 11 30.14	1.8544	2 13 32.2	10.396	11	2 42 40.29	1.9657	10 15 1.8	9.423				
12	1 13 21.43	1.8554	2 23 55.8	10.390	12	2 44 38.33	1.9694	10 24 26.1	9.386				
13	1 15 12.78	1.8565	2 34 19.0	10.383	13	2 46 36.60	1.9731	10 33 48.2	9.349				
14	1 17 4.20	1.8576	2 44 41.8	10.376	14	2 48 35.09	1.9768	10 43 8.0	9.311				
15	1 18 55.68	1.8588	2 55 4.1	10.368	15	2 50 33.80	1.9806	10 52 25.5	9.279				
16	1 20 47.24	1.8600	3 5 26.0	10.360	16	2 52 32.75	1.9844	11 1 40.6	9.232				
17	1 22 38.87	1.8613	3 15 47.3	10.351	17	2 54 31.92	1.9883	11 10 53.3	9.192				
18	1 24 30.58	1.8627	3 26 8.1	10.342	18	2 56 31.33	1.9923	11 20 3.6	9.151				
19	1 26 22.38	1.8641	3 36 28.3	10.332	19	2 58 30.98	1.9963	11 29 11.4	9.108				
20	1 28 14.26	1.8656	3 46 47.9	10.322	20	3 0 30.87	2.0003	11 38 16.6	9.065				
21	1 30 6.23	1.8671	3 57 6.9	10.311	21	3 2 31.01	2.0044	11 47 19.3	9.022				
22	1 31 58.29	1.8687	4 7 25.2	10.300	22	3 4 31.39	2.0086	11 56 19.3	8.978				
23	1 33 50.45	1.8703	N. 4 17 42.8	10.287	23	3 6 32.02	2.0127	N.12 5 16.6	8.933				
FRIDAY 30.					SUNDAY, AUGUST 1.								
0	1 35 42.71	1.8720	N. 4 27 59.6	10.274	0	3 8 32.91	2.0170	N.12 14 11.2	8.887				
1	1 37 35.07	1.8737	4 38 15.6	10.260	PHASES OF THE MOON.								
2	1 39 27.54	1.8755	4 48 30.8	10.246									
3	1 41 20.12	1.8773	4 58 45.1	10.232	☾ Last Quarter, . . . <sup>d</sup> 1 <sup>h</sup> 12 <sup>m</sup> 46.1								
4	1 43 12.81	1.8792	5 8 58.6	10.216									
5	1 45 5.62	1.8812	5 19 11.1	10.200	☉ New Moon, . . . 9 1 37.7								
6	1 46 58.54	1.8833	5 29 22.6	10.184	☽ First Quarter, . . . 15 18 47.9								
7	1 48 51.59	1.8854	5 39 33.1	10.167	☾ Full Moon, . . . 23 1 54.6								
8	1 50 44.77	1.8875	5 49 42.6	10.149	☾ Last Quarter, . . . 31 5 6.5								
9	1 52 38.07	1.8897	5 59 51.0	10.130	☾ Perigee, . . . . . <sup>d</sup> 12 <sup>h</sup> 5.0								
10	1 54 31.51	1.8919	6 9 58.2	10.111									
11	1 56 25.08	1.8941	6 20 4.3	10.092	☾ Apogee, . . . . . 28 0.0								
12	1 58 18.79	1.8964	6 30 9.2	10.071									
13	2 0 12.65	1.8988	6 40 12.8	10.050									
14	2 2 6.65	1.9013	6 50 15.2	10.029									
15	2 4 0.80	1.9038	7 0 16.3	10.007									
16	2 5 55.10	1.9064	7 10 16.0	9.984									
17	2 7 49.56	1.9091	7 20 14.3	9.960									
18	2 9 44.18	1.9118	7 30 11.3	9.936									
19	2 11 38.96	1.9146	7 40 6.8	9.911									
20	2 13 33.91	1.9174	7 50 0.7	9.885									
21	2 15 29.03	1.9202	7 59 53.1	9.859									
22	2 17 24.32	1.9231	8 9 43.9	9.833									
23	2 19 19.79	1.9260	8 19 33.1	9.807									
24	2 21 15.43	1.9290	N. 8 29 20.7	9.778									

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
1	$\alpha$ Aquilæ	W.	69° 44' 29"	3703	71° 1' 13"	3689	72° 18' 12"	3675	73° 35' 26"	3663
	Fomalhaut	W.	35 6 32	3883	36 20 29	3805	37 35 26	3753	38 51 17	3706
	Jupiter	E.	40 10 18	3158	38 43 18	3156	37 16 16	3154	35 49 12	3153
	Aldebaran	E.	63 54 59	3063	62 26 4	3060	60 57 5	3056	59 28 2	3052
	Sun	E.	95 48 18	3429	94 26 34	3426	93 4 47	3423	91 42 56	3418
2	$\alpha$ Aquilæ	W.	80 4 56	3602	81 23 28	3591	82 42 12	3580	84 1 8	3570
	Fomalhaut	W.	45 21 53	3518	46 41 57	3489	48 2 33	3461	49 23 41	3433
	$\alpha$ Pegasi	W.	33 52 43	4435	34 57 33	4323	36 4 4	4226	37 12 6	4137
	Jupiter	E.	28 33 23	3145	27 6 8	3143	25 38 51	3143	24 11 33	3143
	Aldebaran	E.	52 1 28	3027	50 31 49	3022	49 2 3	3014	47 32 8	3006
3	$\alpha$ Aquilæ	W.	84 52 19	3390	83 29 51	3384	82 7 16	3376	80 44 32	3367
	Fomalhaut	W.	90 38 35	3521	91 58 36	3512	93 18 47	3503	94 39 8	3495
	$\alpha$ Pegasi	W.	56 16 38	3313	57 40 34	3292	59 4 55	3270	60 29 41	3250
	Jupiter	W.	43 11 33	3792	44 26 43	3739	45 42 49	3689	46 59 48	3640
	Aldebaran	E.	40 0 2	2963	38 29 3	2954	36 57 52	2943	35 26 28	2939
4	Sun	E.	73 48 19	3319	72 24 30	3309	71 0 29	3296	69 36 15	3286
	Fomalhaut	W.	67 39 25	3153	69 6 31	3134	70 33 59	3115	72 1 50	3097
	$\alpha$ Pegasi	W.	53 36 37	3442	54 58 6	3408	56 20 14	3375	57 42 59	3343
	Sun	E.	62 31 29	3221	61 5 45	3208	59 39 45	3193	58 13 28	3179
	Fomalhaut	W.	79 26 33	3009	80 56 34	2992	82 26 57	2975	83 57 41	2959
5	$\alpha$ Pegasi	W.	64 45 24	3203	66 11 30	3177	67 38 7	3152	69 5 14	3129
	Sun	E.	50 57 36	3103	49 29 30	3087	48 1 4	3071	46 32 19	3054
	Fomalhaut	W.	91 36 28	2880	93 9 13	2864	94 42 18	2850	96 15 41	2836
	$\alpha$ Pegasi	W.	76 27 48	3018	77 57 39	2997	79 27 55	2978	80 58 35	2959
	Sun	E.	39 3 29	2972	37 32 41	2956	36 1 33	2939	34 30 4	2924
11	Sun	W.	25 46 13	2494	27 27 35	2469	29 9 3	2485	30 50 37	2482
	Spica	E.	67 9 11	2228	65 21 25	2227	63 33 37	2225	61 45 47	2224
	Sun	W.	39 19 17	2476	41 1 4	2476	42 42 51	2477	44 24 37	2478
	Venus	W.	21 54 31	2569	23 34 8	2569	25 13 46	2569	26 53 24	2569
	Spica	E.	52 46 42	2232	50 59 2	2235	49 11 26	2239	47 23 56	2245
12	Antares	E.	98 41 9	2233	96 53 31	2233	95 5 53	2224	93 18 16	2235
	Saturn	E.	101 56 9	2168	100 6 53	2168	98 17 37	2169	96 28 23	2171
	Sun	W.	52 52 47	2491	54 34 13	2494	56 15 34	2499	57 56 49	2504
	Venus	W.	35 11 7	2580	36 50 29	2584	38 29 46	2588	40 8 58	2592
	Regulus	W.	16 4 17	2207	17 52 34	2209	19 40 48	2211	21 28 59	2214
13	Spica	E.	38 28 52	2285	36 42 30	2296	34 56 25	2310	33 10 40	2296
	Antares	E.	84 20 55	2249	82 33 41	2253	80 46 32	2258	78 59 30	2263
	Saturn	E.	87 23 0	2184	85 34 8	2188	83 45 22	2192	81 56 42	2196
	Sun	W.	66 21 21	2530	68 1 52	2537	69 42 14	2543	71 22 28	2550
	Venus	W.	48 23 17	2619	50 1 46	2625	51 40 7	2632	53 18 19	2639
14	Regulus	W.	30 28 36	2235	32 16 11	2241	34 3 37	2247	35 50 55	2252
	Antares	E.	70 6 25	2294	68 20 17	2302	66 34 20	2310	64 48 35	2317
	Saturn	E.	72 55 10	2223	71 7 16	2229	69 19 31	2235	67 31 56	2241
	Sun	W.	79 41 10	2586	81 20 24	2594	82 59 27	2601	84 38 20	2610
	Venus	W.	61 26 54	2675	63 4 7	2684	64 41 9	2692	66 18 0	2699

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	$\alpha$ Aquilæ W.	74 52 53	3649	76 10 34	3636	77 28 29	3695	78 46 36	3613
	Fomalhaut W.	40 7 58	3663	41 25 25	3623	42 43 35	3586	44 2 25	3551
	Jupiter E.	34 22 6	3151	32 54 58	3149	31 27 48	3148	30 0 36	3147
	Aldebaran E.	57 58 54	3048	56 29 41	3044	55 0 23	3039	53 30 59	3034
	Sun E.	90 21 0	3414	88 58 59	3408	87 36 52	3403	86 14 39	3397
2	$\alpha$ Aquilæ W.	85 20 15	3560	86 39 33	3549	87 59 3	3539	89 18 44	3530
	Fomalhaut W.	50 45 20	3408	52 7 28	3383	53 30 4	3358	54 53 8	3336
	$\alpha$ Pegasi W.	38 21 32	4055	39 32 17	3980	40 44 16	3913	41 57 23	3851
	Jupiter E.	22 44 15	3143	21 16 58	3145	19 49 43	3148	18 22 32	3155
	Aldebaran E.	46 2 3	2999	44 31 49	2990	43 1 24	2989	41 30 49	2973
	Sun E.	79 21 38	3358	77 58 34	3350	76 35 20	3340	75 11 55	3331
3	$\alpha$ Aquilæ W.	95 59 38	3487	97 20 17	3480	98 41 4	3472	100 1 59	3465
	Fomalhaut W.	61 54 51	3230	63 20 25	3210	64 46 22	3191	66 12 42	3179
	$\alpha$ Pegasi W.	48 17 39	3596	49 36 18	3555	50 55 41	3515	52 15 48	3478
	Aldebaran E.	33 54 50	2921	32 22 58	2910	30 50 52	2898	29 18 31	2887
	Sun E.	68 11 47	3274	66 47 5	3261	65 22 8	3248	63 56 56	3236
4	Fomalhaut W.	73 30 3	3079	74 58 38	3061	76 27 35	3044	77 56 53	3026
	$\alpha$ Pegasi W.	59 6 21	3313	60 30 18	3285	61 54 47	3257	63 19 49	3239
	Sun E.	56 46 54	3164	55 20 2	3149	53 52 52	3133	52 25 23	3119
5	Fomalhaut W.	85 28 45	2942	87 0 10	2926	88 31 56	2910	90 4 2	2894
	$\alpha$ Pegasi W.	70 32 49	3105	72 0 53	3089	73 29 24	3060	74 58 23	3039
	Sun E.	45 3 13	3038	43 33 47	3022	42 4 2	3005	40 33 56	2989
6	Fomalhaut W.	97 49 22	2922	99 23 21	2909	100 57 37	2797	102 32 9	2784
	$\alpha$ Pegasi W.	82 29 39	2941	84 1 6	2923	85 32 56	2905	87 5 8	2889
	Sun E.	32 58 15	2907	31 28 5	2891	29 53 35	2875	28 20 44	2859
11	Sun W.	32 32 16	2480	34 13 58	2477	35 55 43	2476	37 37 30	2476
	Spica E.	59 57 55	2225	58 10 4	2225	56 22 14	2227	54 34 26	2229
12	Sun W.	46 6 21	2480	47 48 3	2482	49 29 41	2485	51 11 16	2487
	Venus W.	28 33 1	2571	30 12 36	2572	31 52 10	2574	33 31 41	2577
	Spica E.	45 36 35	2251	43 49 23	2257	42 2 20	2265	40 15 29	2274
	Antares E.	91 30 41	2237	89 43 9	2239	87 55 40	2242	86 8 15	2245
	Saturn E.	94 39 12	2172	92 50 3	2175	91 0 58	2178	89 11 57	2180
13	Sun W.	59 37 57	2508	61 18 59	2513	62 59 54	2519	64 40 41	2524
	Venus W.	41 48 4	2597	43 27 3	2602	45 5 55	2607	46 44 40	2613
	Regulus W.	23 17 6	2217	25 5 8	2221	26 53 4	2226	28 40 53	2230
	Spica E.	31 25 19	2344	29 40 24	2364	27 55 57	2387	26 12 3	2415
	Antares E.	77 12 36	2268	75 25 50	2274	73 39 12	2280	71 52 43	2287
	Saturn E.	80 8 9	2201	78 19 43	2206	76 31 24	2211	74 43 13	2216
14	Sun W.	73 2 32	2556	74 42 27	2564	76 22 11	2572	78 1 45	2578
	Venus W.	54 56 21	2646	56 34 14	2653	58 11 57	2660	59 49 30	2667
	Regulus W.	37 38 5	2259	39 25 5	2266	41 11 55	2272	42 58 36	2279
	Antares E.	63 3 1	2326	61 17 40	2336	59 32 33	2345	57 47 39	2355
	Saturn E.	65 44 30	2248	63 57 14	2255	62 10 8	2262	60 23 13	2269
15	Sun W.	86 17 2	2618	87 55 33	2626	89 33 52	2635	91 12 0	2643
	Venus W.	67 54 41	2707	69 31 11	2716	71 7 29	2725	72 43 36	2733

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
15	Regulus W.	44 45 6	2288	46 31 26	2293	48 17 36	2300	50 3 35	2308
	Mars W.	15 20 32	2574	17 0 3	2563	18 39 49	2556	20 19 44	2553
	Antares E.	56 3 0	2366	54 18 36	2376	52 34 27	2388	50 50 35	2401
	Saturn E.	58 36 28	2277	56 49 55	2285	55 3 33	2292	53 17 22	2300
	$\alpha$ Aquilæ E.	102 35 44	2871	101 2 48	2871	99 29 52	2873	97 56 58	2875
16	SUN W.	92 49 56	2652	94 27 41	2660	96 5 14	2669	97 42 36	2678
	Venus W.	74 19 32	2742	75 55 16	2750	77 30 49	2760	79 6 10	2769
	Regulus W.	58 50 43	2346	60 35 35	2355	62 20 15	2363	64 4 43	2371
	Mars W.	28 39 29	2565	30 19 12	2569	31 58 49	2575	33 38 18	2582
	Antares E.	42 16 0	2473	40 34 9	2490	38 52 42	2510	37 11 42	2530
	Saturn E.	44 29 26	2342	42 44 28	2351	40 59 43	2359	39 15 10	2369
	$\alpha$ Aquilæ E.	90 13 46	2904	88 41 32	2913	87 9 30	2923	85 37 40	2934
17	SUN W.	105 46 28	2722	107 22 39	2731	108 58 38	2740	110 34 25	2749
	Venus W.	86 59 58	2814	88 34 8	2822	90 8 7	2831	91 41 54	2841
	Regulus W.	72 44 10	2419	74 27 28	2420	76 10 34	2429	77 53 28	2437
	Mars W.	41 53 26	2618	43 31 57	2625	45 10 18	2633	46 48 28	2640
	Saturn E.	30 35 51	2418	28 52 42	2429	27 9 48	2440	25 27 10	2453
	$\alpha$ Aquilæ E.	78 2 20	3003	76 32 11	3019	75 2 22	3037	73 32 55	3057
18	Regulus W.	86 24 59	2479	88 6 42	2488	89 48 12	2496	91 29 31	2504
	Mars W.	54 56 35	2683	56 33 38	2691	58 10 30	2699	59 47 11	2708
	Spica W.	33 10 9	2587	34 49 22	2587	36 28 35	2588	38 7 47	2590
	$\alpha$ Aquilæ E.	66 12 12	3174	64 45 32	3203	63 19 26	3233	61 53 56	3265
	Fomalhaut E.	98 52 14	2722	97 16 4	2730	95 40 4	2737	94 4 13	2744
19	Mars W.	67 47 41	2752	69 23 12	2761	70 58 31	2769	72 33 39	2779
	Spica W.	46 22 49	2609	48 1 32	2614	49 40 8	2620	51 18 36	2626
	$\alpha$ Aquilæ E.	54 56 40	3463	53 35 35	3513	52 15 25	3565	50 56 13	3623
	Fomalhaut E.	86 7 36	2788	84 32 52	2798	82 58 21	2808	81 24 3	2819
	$\alpha$ Pegasi E.	101 19 26	2920	99 47 33	2924	98 15 45	2930	96 44 4	2936
20	Mars W.	80 26 22	2824	82 0 19	2833	83 34 4	2842	85 7 37	2851
	Spica W.	59 28 48	2660	61 6 22	2666	62 43 47	2674	64 21 2	2681
	Fomalhaut E.	73 36 15	2879	72 3 29	2893	70 31 1	2907	68 58 51	2922
	$\alpha$ Pegasi E.	89 7 51	2975	87 37 7	2985	86 6 36	2995	84 36 17	3005
21	Mars W.	92 52 25	2898	94 24 47	2908	95 56 56	2917	97 28 53	2927
	Spica W.	72 24 40	2722	74 0 51	2729	75 36 52	2738	77 12 41	2747
	Antares W.	27 21 33	2944	28 52 56	2928	30 24 39	2916	31 56 38	2906
	Saturn W.	23 18 20	2702	24 54 57	2709	26 31 25	2715	28 7 45	2721
	Fomalhaut E.	61 22 59	3006	59 52 54	3026	58 23 14	3047	56 53 59	3069
	$\alpha$ Pegasi E.	77 8 16	3069	75 39 28	3082	74 10 57	3098	72 42 45	3114
22	Spica W.	85 8 58	2790	86 43 39	2798	88 18 9	2808	89 52 27	2817
	Antares W.	39 38 36	2889	41 11 9	2891	42 43 40	2892	44 16 9	2894
	Saturn W.	36 7 9	2758	37 42 32	2766	39 17 44	2775	40 52 45	2782
	Fomalhaut E.	49 34 56	3198	48 8 45	3231	46 43 12	3265	45 18 19	3300
	$\alpha$ Pegasi E.	65 26 52	3206	64 0 50	3227	62 35 13	3250	61 10 3	3273
	$\alpha$ Arietis E.	108 5 54	2927	106 34 10	2934	105 2 34	2940	103 31 6	2946
23	Antares W.	51 57 31	2916	53 29 30	2921	55 1 22	2927	56 33 7	2932
	Saturn W.	48 45 8	2825	50 19 4	2834	51 52 48	2842	53 26 21	2850
	Fomalhaut E.	38 25 42	3538	37 6 0	3600	35 47 26	3669	34 30 6	3746

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXh.	P. L. of Diff.
15	Regulus W.	51° 49' 23"	2315	53° 35' 0"	2324	55° 20' 25"	2331	57° 5' 39"	2338
	Mars W.	21 59 43	2552	23 39 44	2553	25 19 43	2556	26 59 39	2560
	Antares E.	49 7 2	2414	47 23 47	2426	45 40 50	2441	43 58 14	2457
	Saturn E.	51 31 23	2308	49 45 35	2317	48 0 0	2325	46 14 37	2333
	α Aquilæ E.	96 24 7	2879	94 51 21	2884	93 18 42	2890	91 46 10	2896
16	Sun W.	99 19 46	2687	100 56 44	2695	102 33 31	2704	104 10 6	2713
	Venus W.	80 41 19	2778	82 16 16	2786	83 51 2	2795	85 25 36	2805
	Regulus W.	65 49 0	2379	67 33 5	2387	69 16 59	2395	71 0 41	2404
	Mars W.	35 17 38	2588	36 56 50	2595	38 35 52	2602	40 14 44	2610
	Antares E.	35 31 10	2552	33 51 9	2577	32 11 43	2605	30 32 55	2635
	Saturn E.	37 30 51	2378	35 46 45	2388	34 2 53	2398	32 19 15	2408
	α Aquilæ E.	84 6 4	2946	82 34 43	2958	81 3 37	2972	79 32 49	2987
17	Sun W.	112 10 0	2758	113 45 23	2767	115 20 34	2776	116 55 33	2785
	Venus W.	93 15 29	2850	94 48 52	2859	96 22 3	2869	97 55 2	2878
	Regulus W.	79 36 10	2445	81 18 40	2454	83 0 58	2462	84 43 4	2470
	Mars W.	48 26 28	2649	50 4 17	2657	51 41 54	2666	53 19 20	2674
	Saturn E.	23 44 50	2465	22 2 48	2479	20 21 5	2494	18 39 43	2512
	α Aquilæ E.	72 3 53	2978	70 35 16	2990	69 7 6	3002	67 39 24	3018
18	Regulus W.	93 10 38	2513	94 51 33	2522	96 32 16	2530	98 12 47	2538
	Mars W.	61 23 40	2716	62 59 58	2725	64 36 4	2735	66 11 58	2743
	Spica W.	39 46 56	2592	41 26 2	2596	43 5 3	2599	44 43 59	2604
	α Aquilæ E.	60 29 3	2999	59 4 50	3037	57 41 21	3076	56 18 37	3417
	Fomalhaut E.	92 28 32	2752	90 53 1	2760	89 17 41	2769	87 42 32	2779
19	Mars W.	74 8 35	2788	75 43 19	2796	77 17 52	2805	78 52 13	2815
	Spica W.	52 56 56	2632	54 35 7	2638	56 13 10	2645	57 51 4	2652
	α Aquilæ E.	49 38 4	2686	48 21 2	2752	47 5 10	2825	45 50 34	2908
	Fomalhaut E.	79 50 0	2830	78 16 11	2841	76 42 36	2853	75 9 17	2866
	α Pegasi E.	95 12 31	2942	93 41 6	2950	92 9 51	2958	90 38 46	2966
20	Mars W.	86 40 59	2860	88 14 9	2870	89 47 6	2880	91 19 51	2888
	Spica W.	65 58 7	2689	67 35 1	2697	69 11 45	2705	70 48 18	2713
	Fomalhaut E.	67 27 0	2937	65 55 28	2954	64 24 17	2970	62 53 27	2988
	α Pegasi E.	83 6 11	3017	81 36 19	3029	80 6 42	3042	78 37 21	3055
21	Mars W.	99 0 38	2936	100 32 11	2946	102 3 32	2955	103 34 41	2965
	Spica W.	78 48 19	2755	80 23 46	2764	81 59 1	2772	83 34 5	2781
	Antares W.	33 28 49	2699	35 1 9	2694	36 33 35	2692	38 6 4	2690
	Saturn W.	29 43 57	2726	31 20 0	2735	32 55 53	2743	34 31 36	2750
	Fomalhaut E.	55 25 11	3091	53 56 51	3116	52 29 1	3142	51 1 42	3169
	α Pegasi E.	71 14 52	3130	69 47 19	3148	68 20 8	3167	66 53 19	3185
22	Spica W.	91 26 33	2826	93 0 27	2835	94 34 10	2844	96 7 41	2853
	Antares W.	45 48 35	2698	47 20 57	2691	48 53 14	2696	50 25 25	26910
	Saturn W.	42 27 36	2791	44 2 16	2800	45 36 44	2808	47 11 1	2816
	Fomalhaut E.	43 54 8	3340	42 30 43	3364	41 8 8	3431	39 46 26	3482
	α Pegasi E.	59 45 20	3298	58 21 6	3325	56 57 24	3353	55 34 14	3383
	α Arietis E.	101 59 46	2954	100 28 35	2962	98 57 34	2969	97 26 42	2977
23	Antares W.	58 4 45	2839	59 36 15	2846	61 7 36	2852	62 38 49	2858
	Saturn W.	54 50 44	2859	56 32 56	2868	58 5 56	2876	59 38 45	2884
	Fomalhaut E.	33 14 8	3833	31 59 40	3829	30 46 50	4039	29 35 49	4167

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
23	$\alpha$ Pegasi E.	54 11 38	3415	52 49 38	3448	51 28 16	3484	50 7 34	3523
	$\alpha$ Arietis E.	95 56 0	2985	94 25 28	2993	92 55 7	3001	91 24 56	3009
	Jupiter E.	107 45 30	2888	106 12 56	2898	104 40 34	2906	103 8 23	2915
24	Antares W.	64 9 54	2965	65 40 51	2972	67 11 39	2979	68 42 18	2985
	Saturn W.	61 11 24	2893	62 43 52	2901	64 16 9	2909	65 48 16	2917
	$\alpha$ Pegasi E.	43 35 48	3789	42 20 11	3826	41 5 36	3894	39 52 10	3968
	$\alpha$ Arietis E.	83 56 44	3056	82 27 40	3065	80 58 48	3075	79 30 8	3084
	Jupiter E.	95 30 10	2958	93 59 4	2965	92 28 8	2974	90 57 23	2982
25	Antares W.	76 13 25	3020	77 43 13	3027	79 12 52	3034	80 42 23	3039
	Saturn W.	73 26 19	2956	74 57 27	2964	76 28 25	2971	77 59 14	2978
	$\alpha$ Aquilæ W.	38 35 43	4804	39 35 16	4890	40 36 24	4593	41 38 55	4507
	$\alpha$ Arietis E.	72 9 48	3136	70 42 22	3147	69 15 9	3158	67 48 9	3168
	Jupiter E.	83 26 8	3022	81 56 22	3029	80 26 45	3036	78 57 17	3043
	Aldebaran E.	103 30 12	2963	101 59 13	2970	100 28 23	2977	98 57 42	2984
26	Antares W.	88 8 0	3072	89 36 44	3077	91 5 22	3082	92 33 53	3088
	Saturn W.	85 31 10	3010	87 1 10	3017	88 31 2	3022	90 0 47	3027
	$\alpha$ Aquilæ W.	47 8 35	4180	48 17 20	4133	49 26 50	4089	50 37 2	4049
	$\alpha$ Arietis E.	60 36 30	3227	59 10 53	3239	57 45 30	3252	56 20 22	3265
	Jupiter E.	71 32 7	3077	70 3 29	3082	68 34 58	3088	67 6 34	3094
	Aldebaran E.	91 26 22	3017	89 56 30	3022	88 26 45	3028	86 57 7	3034
27	Antares W.	99 54 52	3113	101 22 46	3118	102 50 36	3120	104 18 21	3124
	Saturn W.	97 28 2	3050	98 57 13	3054	100 26 19	3057	101 55 21	3060
	$\alpha$ Aquilæ W.	56 36 45	3897	57 50 8	3873	59 3 55	3852	60 18 4	3830
	$\alpha$ Arietis E.	49 18 48	3340	47 55 23	3357	46 32 17	3375	45 9 32	3394
	Jupiter E.	59 46 10	3118	58 18 22	3122	56 50 39	3125	55 23 0	3129
	Aldebaran E.	79 30 29	3056	78 1 25	3060	76 32 26	3069	75 3 30	3065
28	$\alpha$ Aquilæ W.	66 33 37	3748	67 49 33	3736	69 5 42	3723	70 22 5	3710
	Fomalhaut W.	32 2 19	4037	33 13 22	3966	34 25 35	3904	35 38 51	3848
	$\alpha$ Arietis E.	38 21 53	3617	37 1 48	3551	35 42 20	3587	34 23 31	3525
	Jupiter F.	48 5 40	3141	46 38 20	3143	45 11 2	3143	43 43 45	3145
	Aldebaran E.	67 39 37	3075	66 10 57	3075	64 42 17	3075	63 13 37	3075
29	$\alpha$ Aquilæ W.	76 46 58	3659	78 4 29	3650	79 22 9	3641	80 39 59	3633
	Fomalhaut W.	41 58 10	3630	43 16 12	3598	44 34 49	3568	45 54 0	3538
	$\alpha$ Pegasi W.	31 18 14	4808	32 17 44	4666	33 19 12	4540	34 22 29	4427
	Jupiter E.	36 27 34	3146	35 0 20	3145	33 33 5	3145	32 5 50	3145
	Aldebaran E.	55 50 6	3069	54 21 18	3065	52 52 26	3063	51 23 31	3060
	SUN E.	114 21 12	3432	112 59 32	3429	111 37 48	3425	110 16 0	3422
30	$\alpha$ Aquilæ W.	87 11 20	3594	88 30 1	3587	89 48 49	3580	91 7 45	3574
	Fomalhaut W.	52 37 11	3419	53 59 6	3399	55 21 24	3379	56 44 4	3360
	$\alpha$ Pegasi W.	40 1 29	4007	41 13 2	3944	42 25 37	3886	43 39 11	3832
	Aldebaran E.	43 57 40	3034	42 28 10	3029	40 58 33	3029	39 28 48	3015
	SUN E.	103 25 45	3395	102 3 23	3388	100 40 53	3380	99 18 14	3373
31	$\alpha$ Aquilæ W.	97 44 9	3544	99 3 45	3539	100 23 26	3535	101 43 12	3530
	Fomalhaut W.	63 42 46	3270	65 7 33	3253	66 32 40	3236	67 58 7	3218
	$\alpha$ Pegasi W.	49 59 42	3613	51 18 2	3576	52 37 3	3541	53 56 42	3507
	Aldebaran E.	31 57 37	2973	30 26 50	2963	28 55 51	2953	27 24 39	2942
	SUN F.	92 22 37	3327	90 58 57	3315	89 35 3	3305	88 10 57	3293



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXh.	P. L. of Diff.
23	$\alpha$ Pegasi E.	48° 47' 35"	3565	47° 28' 22"	3609	46° 9' 57"	3657	44° 52' 24"	3710
	$\alpha$ Arietis E.	89 54 55	3018	88 25 5	3028	86 55 27	3037	85 26 0	3046
	Jupiter E.	101 36 23	2994	100 4 34	2931	98 32 55	2940	97 1 27	2949
24	Antares W.	70 12 49	2993	71 43 11	3000	73 13 24	3006	74 43 29	3014
	Saturn W.	67 20 13	2925	68 52 0	2934	70 23 36	2942	71 55 2	2949
	$\alpha$ Pegasi E.	38 39 59	4049	37 29 8	4138	36 19 43	4237	35 11 52	4350
	$\alpha$ Arietis E.	78 1 39	3095	76 33 23	3105	75 5 19	3114	73 37 27	3125
	Jupiter E.	89 26 48	2990	87 56 23	2999	86 26 9	3006	84 56 4	3014
25	Antares W.	82 11 47	3047	83 41 2	3053	85 10 9	3060	86 39 8	3065
	Saturn W.	79 29 54	2965	81 0 25	2992	82 30 48	2998	84 1 3	3005
	$\alpha$ Aquilæ W.	42 42 41	4428	43 47 37	4355	44 53 39	4291	46 0 40	4233
	$\alpha$ Arietis E.	66 21 22	3179	64 54 48	3191	63 28 28	3203	62 2 22	3214
	Jupiter E.	77 27 58	3051	75 58 48	3057	74 29 46	3065	73 0 53	3070
	Aldebaran E.	97 27 9	2991	95 56 45	2997	94 26 29	3005	92 56 22	3010
26	Antares W.	94 2 17	3093	95 30 35	3099	96 58 46	3103	98 26 52	3108
	Saturn W.	91 30 26	3033	92 59 58	3037	94 29 25	3042	95 58 46	3046
	$\alpha$ Aquilæ W.	51 47 53	4014	52 59 19	3980	54 11 18	3950	55 23 47	3921
	$\alpha$ Arietis E.	54 55 30	3279	53 30 54	3283	52 6 34	3308	50 42 32	3324
	Jupiter E.	65 38 17	3099	64 10 6	3105	62 42 2	3109	61 14 3	3114
	Aldebaran E.	85 27 36	3039	83 58 11	3043	82 28 52	3047	80 59 38	3052
27	Antares W.	105 46 2	3127	107 13 39	3130	108 41 12	3133	110 8 41	3137
	Saturn W.	103 24 19	3063	104 53 14	3065	106 22 6	3067	107 50 56	3069
	$\alpha$ Aquilæ W.	61 32 35	3819	62 47 25	3795	64 2 32	3779	65 17 56	3763
	$\alpha$ Arietis E.	43 47 9	3415	42 25 10	3438	41 3 36	3463	39 42 30	3488
	Jupiter E.	53 55 25	3132	52 27 54	3134	51 0 26	3138	49 33 2	3139
	Aldebaran E.	73 34 38	3068	72 5 49	3070	70 37 3	3072	69 8 19	3073
28	$\alpha$ Aquilæ W.	71 38 41	3699	72 55 29	3689	74 12 28	3678	75 29 38	3669
	Fomalhaut W.	36 53 4	3796	38 8 10	3748	39 24 6	3706	40 40 47	3666
	$\alpha$ Arietis E.	33 5 24	3670	31 48 5	3723	30 31 42	3782	29 16 21	3847
	Jupiter E.	42 16 30	3146	40 49 16	3146	39 22 2	3146	37 54 48	3146
	Aldebaran E.	61 44 57	3075	60 16 17	3073	58 47 35	3073	57 18 52	3070
29	$\alpha$ Aquilæ W.	81 57 58	3694	83 16 6	3617	84 34 22	3609	85 52 47	3601
	Fomalhaut W.	47 13 42	3511	48 33 54	3486	49 54 34	3463	51 15 40	3440
	$\alpha$ Pegasi W.	35 27 26	4226	36 33 55	4233	37 41 50	4151	38 51 3	4075
	Jupiter E.	30 38 35	3146	29 11 21	3146	27 44 7	3148	26 16 55	3153
	Aldebaran E.	49 54 32	3056	48 25 28	3051	46 56 18	3046	45 27 2	3041
	Sun E.	108 54 8	3417	107 32 11	3413	106 10 9	3407	104 48 0	3401
30	$\alpha$ Aquilæ W.	92 26 48	3566	93 45 59	3561	95 5 16	3555	96 24 39	3549
	Fomalhaut W.	58 7 6	3342	59 30 29	3323	60 54 14	3305	62 18 20	3288
	$\alpha$ Pegasi W.	44 53 40	3783	46 9 0	3738	47 25 9	3693	48 42 4	3652
	Aldebaran E.	37 58 54	3007	36 28 50	3000	34 58 37	2991	33 28 13	2981
	Sun E.	97 55 27	3365	96 32 30	3356	95 9 23	3346	93 46 5	3338
31	$\alpha$ Aquilæ W.	103 3 3	3526	104 22 58	3523	105 42 57	3520	107 2 59	3517
	Fomalhaut W.	69 23 55	3201	70 50 3	3185	72 16 30	3168	73 43 17	3152
	$\alpha$ Pegasi W.	55 16 58	3476	56 37 49	3446	57 59 14	3416	59 21 12	3387
	Aldebaran E.	25 53 14	2931	24 21 35	2920	22 49 42	2909	21 17 34	2896
	Sun E.	86 46 37	3281	85 22 3	3268	83 57 14	3255	82 32 10	3242

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be added to		Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.	subtracted from Apparent Time.				
Sun.	1	<sup>h</sup> 8 <sup>m</sup> 46 <sup>s</sup> 33.98	9.706	N. 17° 57' 52.4"	37.97	15' 48.08	66.62	<sup>m</sup> 6 <sup>s</sup> 1.43		0.150	
Mon.	2	8 50 26.62	9.682	17 42 32.3	38.70	15 48.21	66.54	5 57.52		0.174	
Tues.	3	8 54 18.65	9.658	17 26 54.9	39.42	15 48.34	66.45	5 53.02		0.198	
Wed.	4	8 58 10.09	9.633	17 11 0.5	40.12	15 48.47	66.36	5 47.93		0.223	
Thur.	5	9 2 0.94	9.609	16 54 49.2	40.81	15 48.61	66.27	5 42.24		0.247	
Frid.	6	9 5 51.21	9.584	16 38 21.3	41.49	15 48.76	66.19	5 35.97		0.272	
Sat.	7	9 9 40.89	9.560	16 21 37.3	42.16	15 48.91	66.10	5 29.11		0.296	
Sun.	8	9 13 29.99	9.535	16 4 37.5	42.81	15 49.06	66.02	5 21.68		0.321	
Mon.	9	9 17 18.51	9.511	15 47 22.1	43.45	15 49.22	65.93	5 13.66		0.345	
Tues.	10	9 21 6.44	9.486	15 29 51.7	44.08	15 49.39	65.85	5 5.06		0.370	
Wed.	11	9 24 53.78	9.462	15 12 6.6	44.70	15 49.56	65.77	4 55.87		0.394	
Thur.	12	9 28 40.54	9.438	14 54 6.7	45.30	15 49.73	65.69	4 46.10		0.418	
Frid.	13	9 32 26.72	9.414	14 35 52.5	45.89	15 49.91	65.61	4 35.76		0.442	
Sat.	14	9 36 12.35	9.391	14 17 24.3	46.46	15 50.09	65.53	4 24.87		0.465	
Sun.	15	9 39 57.43	9.368	13 58 42.5	47.02	15 50.27	65.45	4 13.42		0.489	
Mon.	16	9 43 41.96	9.345	13 39 47.6	47.57	15 50.46	65.38	4 1.43		0.511	
Tues.	17	9 47 25.95	9.323	13 20 39.7	48.11	15 50.65	65.30	3 48.90		0.533	
Wed.	18	9 51 9.41	9.302	13 1 19.1	48.63	15 50.85	65.23	3 35.84		0.554	
Thur.	19	9 54 52.36	9.281	12 41 46.2	49.14	15 51.04	65.16	3 22.28		0.575	
Frid.	20	9 58 34.82	9.261	12 22 1.2	49.63	15 51.24	65.09	3 8.23		0.595	
Sat.	21	10 2 16.82	9.241	12 2 4.6	50.11	15 51.44	65.02	2 53.70		0.615	
Sun.	22	10 5 58.34	9.222	11 41 56.5	50.58	15 51.64	64.96	2 38.71		0.634	
Mon.	23	10 9 39.41	9.204	11 21 37.3	51.04	15 51.84	64.89	2 23.27		0.652	
Tues.	24	10 13 20.06	9.186	11 1 7.3	51.48	15 52.05	64.83	2 7.40		0.670	
Wed.	25	10 17 0.29	9.169	10 40 26.8	51.91	15 52.26	64.77	1 51.13		0.687	
Thur.	26	10 20 40.13	9.153	10 19 36.0	52.33	15 52.47	64.71	1 34.46		0.703	
Frid.	27	10 24 19.61	9.138	9 58 35.3	52.74	15 52.68	64.65	1 17.43		0.718	
Sat.	28	10 27 58.73	9.123	9 37 25.2	53.13	15 52.90	64.60	1 0.04		0.733	
Sun.	29	10 31 37.50	9.109	9 16 5.8	53.51	15 53.12	64.54	0 42.32		0.747	
Mon.	30	10 35 15.95	9.096	8 54 37.5	53.88	15 53.34	64.49	0 24.28		0.760	
Tues.	31	10 38 54.09	9.084	8 33 0.5	54.23	15 53.56	64.44	0 5.92		0.772	
Wed.	32	10 42 31.94	9.072	N. 8 11 15.0	54.57	15 53.79	64.40	0 12.74		0.784	

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.18 from the Sidereal Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be subtracted from		Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	added to Mean Time.			
Sun.	1	<sup>h</sup> 8 <sup>m</sup> 46 <sup>s</sup> 33.00	9.706	N. 17° 57' 56.2"	37.97	<sup>m</sup> 6 <sup>s</sup> 1.45	0.150	<sup>h</sup> 8 <sup>m</sup> 40 <sup>s</sup> 31.55	
Mon.	2	8 50 25.64	9.682	17 42 36.2	38.70	5 57.54	0.174	8 44 28.10	
Tues.	3	8 54 17.70	9.658	17 26 58.8	39.42	5 53.04	0.198	8 48 24.66	
Wed.	4	8 58 9.16	9.633	17 11 4.2	40.12	5 47.95	0.223	8 52 21.21	
Thur.	5	9 2 0.03	9.609	16 54 53.0	40.81	5 42.26	0.247	8 56 17.77	
Frid.	6	9 5 50.32	9.584	16 38 25.2	41.49	5 36.00	0.272	9 0 14.32	
Sat.	7	9 9 40.02	9.560	16 21 41.2	42.16	5 29.14	0.296	9 4 10.88	
Sun.	8	9 13 29.14	9.535	16 4 41.3	42.81	5 21.71	0.321	9 8 7.43	
Mon.	9	9 17 17.68	9.511	15 47 25.9	43.45	5 13.69	0.345	9 12 3.99	
Tues.	10	9 21 5.63	9.486	15 29 55.5	44.08	5 5.09	0.370	9 16 0.54	
Wed.	11	9 24 53.00	9.462	15 12 10.2	44.70	4 55.90	0.394	9 19 57.10	
Thur.	12	9 28 39.79	9.438	14 54 10.3	45.30	4 46.14	0.418	9 23 53.65	
Frid.	13	9 32 26.00	9.414	14 35 56.0	45.89	4 35.79	0.442	9 27 50.21	
Sat.	14	9 36 11.66	9.391	14 17 27.7	46.46	4 24.90	0.465	9 31 46.76	
Sun.	15	9 39 56.77	9.368	13 58 45.9	47.02	4 13.45	0.488	9 35 43.32	
Mon.	16	9 43 41.33	9.345	13 39 50.9	47.57	4 1.46	0.511	9 39 39.87	
Tues.	17	9 47 25.35	9.323	13 20 42.8	48.11	3 48.93	0.533	9 43 36.42	
Wed.	18	9 51 8.85	9.302	13 1 22.0	48.63	3 35.87	0.554	9 47 32.98	
Thur.	19	9 54 51.84	9.281	12 41 48.9	49.14	3 22.31	0.575	9 51 29.53	
Frid.	20	9 58 34.34	9.261	12 22 3.8	49.63	3 8.26	0.595	9 55 26.08	
Sat.	21	10 2 16.37	9.241	12 2 7.0	50.11	2 53.73	0.615	9 59 22.64	
Sun.	22	10 5 57.93	9.222	11 41 58.7	50.58	2 38.74	0.634	10 3 19.19	
Mon.	23	10 9 39.04	9.204	11 21 39.3	51.04	2 23.30	0.652	10 7 15.74	
Tues.	24	10 13 19.73	9.186	11 1 9.1	51.48	2 7.43	0.670	10 11 12.30	
Wed.	25	10 17 0.01	9.169	10 40 28.4	51.91	1 51.16	0.687	10 15 8.85	
Thur.	26	10 20 39.89	9.153	10 19 37.4	52.33	1 34.48	0.703	10 19 5.41	
Frid.	27	10 24 19.41	9.138	9 58 36.5	52.74	1 17.45	0.718	10 23 1.96	
Sat.	28	10 27 58.57	9.123	9 37 26.1	53.13	1 0.06	0.733	10 26 58.51	
Sun.	29	10 31 37.39	9.109	9 16 6.4	53.51	0 42.32	0.747	10 30 55.07	
Mon.	30	10 35 15.89	9.096	8 54 37.8	53.88	0 24.27	0.760	10 34 51.62	
Tues.	31	10 38 54.08	9.084	8 33 0.6	54.23	0 5.91	0.772	10 38 48.17	
Wed.	32	10 42 31.97	9.072	N. 8 11 14.9	54.57	0 12.75	0.784	10 42 44.72	

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.	Diff. for 1 hour + 9".8565
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NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+ 9<sup>s</sup>.8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S					Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff for 1 hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	213	129° 12' 17.6	12' 1.0	143.59	—0.41	0.0063294	23.4	15 16 57.82	
2	214	130 9 44.4	9 27.7	143.64	0.35	.0062722	24.2	15 13 1.91	
3	215	131 7 12.5	6 55.7	143.69	0.27	.0062129	25.1	15 9 6.00	
4	216	132 4 41.8	4 24.8	143.74	0.18	.0061515	26.0	15 5 10.09	
5	217	133 2 12.3	1 55.1	143.79	—0.06	.0060879	27.0	15 1 14.19	
6	218	133 59 43.9	59 26.6	143.84	+0.07	.0060219	28.0	14 57 18.28	
7	219	134 57 16.7	56 59.3	143.89	0.21	.0059536	29.0	14 53 22.37	
8	220	135 54 50.7	54 33.1	143.94	0.34	.0058830	29.9	14 49 26.45	
9	221	136 52 25.7	52 8.0	143.98	0.45	.0058100	30.9	14 45 30.54	
10	222	137 50 1.7	49 43.9	144.02	0.55	.0057347	31.8	14 41 34.63	
11	223	138 47 38.7	47 20.8	144.07	0.64	.0056573	32.7	14 37 38.72	
12	224	139 45 16.8	44 58.8	144.11	0.69	.0055778	33.5	14 33 42.82	
13	225	140 42 56.0	42 37.8	144.15	0.70	.0054964	34.3	14 29 46.91	
14	226	141 40 36.1	40 17.8	144.19	0.69	.0054132	35.0	14 25 51.00	
15	227	142 38 17.2	37 58.8	144.23	0.66	.0053284	35.7	14 21 55.09	
16	228	143 35 59.4	35 40.9	144.28	0.59	.0052420	36.3	14 17 59.19	
17	229	144 33 42.7	33 24.1	144.33	0.49	.0051543	36.8	14 14 3.29	
18	230	145 31 27.2	31 8.4	144.38	0.38	.0050653	37.3	14 10 7.38	
19	231	146 29 12.8	28 53.9	144.43	0.25	.0049752	37.7	14 6 11.47	
20	232	147 26 59.6	26 40.6	144.48	+0.12	.0048841	38.1	14 2 15.56	
21	233	148 24 47.7	24 28.6	144.53	—0.02	.0047923	38.5	13 58 19.65	
22	234	149 22 37.1	22 17.9	144.59	0.15	.0046996	38.8	13 54 23.74	
23	235	150 20 28.0	20 8.7	144.65	0.26	.0046061	39.2	13 50 27.84	
24	236	151 18 20.5	18 1.1	144.72	0.35	.0045118	39.5	13 46 31.93	
25	237	152 16 14.8	15 55.3	144.79	0.43	.0044167	39.8	13 42 36.02	
26	238	153 14 10.9	13 51.3	144.87	0.47	.0043207	40.1	13 38 40.12	
27	239	154 12 8.7	11 49.0	144.94	0.48	.0042238	40.5	13 34 44.21	
28	240	155 10 8.3	9 48.5	145.02	0.46	.0041260	40.9	13 30 48.29	
29	241	156 8 9.9	7 50.0	145.10	0.41	.0040271	41.4	13 26 52.38	
30	242	157 6 13.4	5 53.4	145.18	0.33	.0039270	41.9	13 22 56.47	
31	243	158 4 18.7	3 58.6	145.26	0.23	.0038256	42.4	13 19 0.57	
32	244	159 2 26.0	2 5.8	145.34	—0.13	0.0037229	43.0	13 15 4.66	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>m</sup> .840	

## GREENWICH MEAN TIME

## THE MOON'S

Day of the Month.

Day of the Month	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.			
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.				
1	15' 7.5	15' 13.1	55' 24.0	+1.60	55' 44.3	+1.78	<sup>h</sup> 19 <sup>m</sup> 4.2	<sup>m</sup> 2.02	<sup>d</sup> 22.9			
2	15 19.1	15 25.7	56 6.6	1.93	56 30.6	2.06	19 54.0	2.15	23.9			
3	15 32.6	15 39.8	56 56.0	2.16	57 22.4	2.23	20 47.3	2.29	24.9			
4	15 47.1	15 54.4	57 49.4	2.25	58 16.3	2.23	21 43.7	2.41	25.9			
5	16 1.6	16 8.5	58 42.6	2.15	59 7.8	2.03	22 42.3	2.47	26.9			
6	16 14.8	16 20.5	59 31.1	1.85	59 52.0	1.62	23 41.6	2.45	27.9			
7	16 25.4	16 29.3	60 9.9	1.35	60 24.4	1.05	♄		28.9			
8	16 32.2	16 34.0	60 35.1	0.72	60 41.8	+0.38				0 40.3	2.41	0.6
9	16 34.7	16 34.3	60 44.3	+0.04	60 42.7	-0.29				1 37.4	2.33	1.6
10	16 32.8	16 30.4	60 37.3	-0.61	60 28.2	0.90	2 32.4	2.25	2.6			
11	16 27.0	16 22.9	60 15.9	1.14	60 0.9	1.35	3 25.8	2.19	3.6			
12	16 18.3	16 13.1	59 43.7	1.51	59 24.9	1.63	4 18.0	2.16	4.6			
13	16 7.6	16 2.0	59 4.8	1.71	58 44.0	1.75	5 9.9	2.16	5.6			
14	15 56.2	15 50.5	58 22.9	1.76	58 1.8	1.75	6 1.9	2.18	6.6			
15	15 44.8	15 39.3	57 41.0	1.71	57 20.8	1.66	6 54.3	2.19	7.6			
16	15 34.0	15 28.9	57 1.3	1.59	56 42.6	1.52	7 47.1	2.00	8.6			
17	15 24.1	15 19.5	56 24.8	1.45	56 7.9	1.37	8 39.7	2.18	9.6			
18	15 15.2	15 11.1	55 52.0	1.29	55 37.0	1.20	9 31.7	2.13	10.6			
19	15 7.3	15 3.7	55 23.0	1.12	55 10.1	1.04	10 22.2	2.07	11.6			
20	15 0.5	14 57.5	54 58.1	0.96	54 47.1	0.87	11 10.8	1.98	12.6			
21	14 54.8	14 52.3	54 37.1	0.79	54 28.2	0.70	11 57.4	1.89	13.6			
22	14 50.2	14 48.4	54 20.4	0.60	54 13.7	0.51	12 41.9	1.82	14.6			
23	14 46.9	14 45.8	54 8.2	0.40	54 4.1	0.29	13 24.8	1.76	15.6			
24	14 45.0	14 44.7	54 1.3	-0.17	54 0.1	-0.03	14 6.7	1.73	16.6			
25	14 44.8	14 45.5	54 0.6	+0.11	54 2.9	+0.27	14 48.2	1.73	17.6			
26	14 46.6	14 48.3	54 7.2	0.44	54 13.5	0.62	15 29.9	1.77	18.6			
27	14 50.7	14 53.6	54 22.0	0.80	54 32.7	0.99	16 12.9	1.82	19.6			
28	14 57.1	15 1.3	54 45.7	1.18	55 1.0	1.37	16 57.7	1.92	20.6			
29	15 6.1	15 11.5	55 18.6	1.56	55 38.5	1.75	17 45.0	2.04	21.6			
30	15 17.5	15 24.0	56 0.5	1.92	56 24.4	2.07	18 35.4	2.18	22.6			
31	15 31.0	15 38.4	56 50.1	2.20	57 17.2	2.31	19 28.9	2.30	23.6			
32	15 46.1	15 53.9	57 45.5	+2.38	58 14.3	+2.41	20 25.1	2.39	24.6			

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 1.					TUESDAY 3.				
0	3 8 32.91	2.0170	N.12 14 11.2	8.887	0	4 50 56.37	2.2593	N.18 11 2.8	5.619
1	3 10 34.06	2.0213	12 23 3.0	8.840	1	4 53 12.09	2.2648	18 16 37.2	5.597
2	3 12 35.46	2.0256	12 31 52.0	8.792	2	4 55 28.14	2.2703	18 22 6.0	5.433
3	3 14 37.12	2.0299	12 40 38.1	8.744	3	4 57 44.52	2.2757	18 27 29.2	5.339
4	3 16 39.04	2.0343	12 49 21.3	8.694	4	5 0 1.22	2.2811	18 32 46.7	5.244
5	3 18 41.22	2.0387	12 58 1.5	8.644	5	5 2 18.25	2.2865	18 37 58.5	5.148
6	3 20 43.67	2.0432	13 6 38.6	8.593	6	5 4 35.60	2.2919	18 43 4.5	5.051
7	3 22 46.39	2.0477	13 15 12.7	8.542	7	5 6 53.27	2.2973	18 48 4.6	4.953
8	3 24 49.39	2.0523	13 23 43.6	8.489	8	5 9 11.27	2.3027	18 52 58.8	4.854
9	3 26 52.67	2.0569	13 32 11.4	8.436	9	5 11 29.59	2.3080	18 57 47.0	4.753
10	3 28 56.23	2.0616	13 40 35.9	8.382	10	5 13 48.23	2.3133	19 2 29.2	4.652
11	3 31 0.07	2.0663	13 48 57.2	8.327	11	5 16 7.19	2.3186	19 7 5.3	4.550
12	3 33 4.19	2.0710	13 57 15.1	8.270	12	5 18 26.47	2.3239	19 11 35.2	4.447
13	3 35 8.60	2.0758	14 5 29.6	8.213	13	5 20 46.06	2.3292	19 15 58.9	4.343
14	3 37 13.29	2.0806	14 13 40.7	8.155	14	5 23 5.97	2.3345	19 20 16.3	4.238
15	3 39 18.27	2.0855	14 21 48.2	8.096	15	5 25 26.19	2.3397	19 24 27.4	4.132
16	3 41 23.54	2.0904	14 29 52.2	8.036	16	5 27 46.73	2.3449	19 28 32.1	4.025
17	3 43 29.11	2.0953	14 37 52.6	7.976	17	5 30 7.57	2.3500	19 32 30.3	3.916
18	3 45 34.97	2.1003	14 45 49.3	7.915	18	5 32 28.72	2.3551	19 36 22.0	3.807
19	3 47 41.13	2.1053	14 53 42.3	7.852	19	5 34 50.18	2.3602	19 40 7.2	3.697
20	3 49 47.60	2.1103	15 1 31.5	7.788	20	5 37 11.94	2.3652	19 43 45.7	3.586
21	3 51 54.37	2.1153	15 9 16.9	7.724	21	5 39 34.01	2.3702	19 47 17.5	3.474
22	3 54 1.44	2.1203	15 16 58.4	7.659	22	5 41 56.37	2.3751	19 50 42.6	3.361
23	3 56 8.81	2.1253	N.15 24 36.0	7.593	23	5 44 19.02	2.3800	N.19 54 0.9	3.248
MONDAY 2.					WEDNESDAY 4.				
0	3 58 16.49	2.1304	N.15 32 9.6	7.526	0	5 46 41.97	2.3849	N.19 57 12.3	3.134
1	4 0 24.48	2.1356	15 39 39.1	7.457	1	5 49 5.21	2.3897	20 0 16.8	3.018
2	4 2 32.78	2.1408	15 47 4.5	7.388	2	5 51 28.74	2.3945	20 3 14.4	2.901
3	4 4 41.39	2.1461	15 54 25.7	7.318	3	5 53 52.55	2.3993	20 6 5.0	2.783
4	4 6 50.32	2.1514	16 1 42.7	7.247	4	5 56 16.65	2.4040	20 8 48.4	2.665
5	4 8 59.57	2.1567	16 8 55.4	7.176	5	5 58 41.03	2.4087	20 11 24.7	2.546
6	4 11 9.13	2.1620	16 16 3.8	7.103	6	6 1 5.69	2.4133	20 13 53.9	2.426
7	4 13 19.01	2.1673	16 23 7.7	7.028	7	6 3 30.62	2.4178	20 16 15.8	2.305
8	4 15 29.20	2.1726	16 30 7.2	6.953	8	6 5 55.82	2.4222	20 18 30.5	2.184
9	4 17 39.71	2.1779	16 37 2.2	6.878	9	6 8 21.28	2.4266	20 20 37.9	2.062
10	4 19 50.55	2.1832	16 43 52.6	6.801	10	6 10 47.00	2.4309	20 22 37.9	1.939
11	4 22 1.71	2.1886	16 50 38.3	6.723	11	6 13 12.98	2.4351	20 24 30.5	1.814
12	4 24 13.20	2.1940	16 57 19.4	6.644	12	6 15 39.21	2.4393	20 26 15.6	1.689
13	4 26 25.01	2.1994	17 3 55.7	6.564	13	6 18 5.69	2.4434	20 27 53.2	1.563
14	4 28 37.14	2.2048	17 10 27.1	6.483	14	6 20 32.42	2.4475	20 29 23.2	1.437
15	4 30 49.60	2.2102	17 16 53.7	6.402	15	6 22 59.40	2.4516	20 30 45.6	1.310
16	4 33 2.38	2.2156	17 23 15.3	6.319	16	6 25 26.62	2.4556	20 32 0.4	1.182
17	4 35 15.48	2.2211	17 29 31.9	6.234	17	6 27 54.07	2.4595	20 33 7.5	1.054
18	4 37 28.91	2.2265	17 35 43.4	6.149	18	6 30 21.76	2.4633	20 34 6.9	0.925
19	4 39 42.67	2.2320	17 41 49.8	6.063	19	6 32 49.67	2.4670	20 34 58.5	0.795
20	4 41 56.76	2.2374	17 47 51.0	5.976	20	6 35 17.80	2.4706	20 35 42.3	0.664
21	4 44 11.17	2.2429	17 53 46.9	5.888	21	6 37 46.14	2.4741	20 36 18.2	0.533
22	4 46 25.91	2.2483	17 59 37.6	5.799	22	6 40 14.69	2.4775	20 36 46.3	0.402
23	4 48 40.98	2.2538	18 5 22.9	5.710	23	6 42 43.44	2.4809	20 37 6.5	0.270
24	4 50 56.37	2.2593	N.18 11 2.8	5.619	24	6 45 12.40	2.4842	N.20 37 18.7	0.137

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 5.					SATURDAY 7.				
0	<sup>h</sup> 6 <sup>m</sup> 45 <sup>s</sup> 12.40	2.4842	N.20° 37' 18.7"	0.137	0	<sup>h</sup> 8 <sup>m</sup> 46 <sup>s</sup> 32.09	2.5348	N.18° 6' 9.0"	6.406
1	6 47 41.56	2.4875	20 37 22.9	0.003	1	8 49 4.15	2.5336	17 59 40.7	6.535
2	6 50 10.91	2.4907	20 37 19.1	0.130	2	8 51 36.13	2.5323	17 53 4.8	6.663
3	6 52 40.44	2.4938	20 37 7.3	0.264	3	8 54 8.03	2.5310	17 46 21.2	6.790
4	6 55 10.16	2.4968	20 36 47.4	0.399	4	8 56 39.85	2.5296	17 39 30.0	6.916
5	6 57 40.05	2.4997	20 36 19.4	0.534	5	8 59 11.58	2.5280	17 32 31.2	7.042
6	7 0 10.12	2.5025	20 35 43.3	0.670	6	9 1 43.21	2.5264	17 25 24.9	7.167
7	7 2 40.35	2.5053	20 34 59.0	0.806	7	9 4 14.75	2.5248	17 18 11.2	7.290
8	7 5 10.74	2.5078	20 34 6.6	0.942	8	9 6 46.19	2.5231	17 10 50.1	7.413
9	7 7 41.28	2.5103	20 33 6.0	1.079	9	9 9 17.52	2.5214	17 3 21.7	7.535
10	7 10 11.97	2.5127	20 31 57.1	1.216	10	9 11 48.75	2.5196	16 55 45.9	7.656
11	7 12 42.81	2.5151	20 30 40.0	1.354	11	9 14 19.87	2.5177	16 48 2.9	7.777
12	7 15 13.78	2.5173	20 29 14.6	1.491	12	9 16 50.87	2.5157	16 40 12.7	7.896
13	7 17 44.89	2.5195	20 27 41.0	1.629	13	9 19 21.75	2.5137	16 32 15.4	8.013
14	7 20 16.12	2.5215	20 25 59.1	1.767	14	9 21 52.51	2.5116	16 24 11.1	8.130
15	7 22 47.48	2.5235	20 24 8.9	1.906	15	9 24 23.14	2.5094	16 15 59.8	8.246
16	7 25 18.96	2.5254	20 22 10.4	2.044	16	9 26 53.63	2.5072	16 7 41.6	8.361
17	7 27 50.54	2.5272	20 20 3.6	2.183	17	9 29 23.99	2.5049	15 59 16.5	8.475
18	7 30 22.22	2.5289	20 17 48.5	2.322	18	9 31 54.21	2.5026	15 50 44.6	8.587
19	7 32 53.99	2.5304	20 15 25.0	2.461	19	9 34 24.29	2.5002	15 42 6.0	8.698
20	7 35 25.86	2.5319	20 12 53.2	2.600	20	9 36 54.23	2.4978	15 33 20.8	8.808
21	7 37 57.82	2.5333	20 10 13.0	2.739	21	9 39 24.02	2.4953	15 24 29.1	8.917
22	7 40 29.86	2.5346	20 7 24.5	2.878	22	9 41 53.67	2.4928	15 15 30.8	9.025
23	7 43 1.97	2.5358	N.20 4 27.7	3.017	23	9 44 23.16	2.4903	N.15 6 26.1	9.131
FRIDAY 6.					SUNDAY 8.				
0	7 45 34.14	2.5369	N.20 1 22.5	3.156	0	9 46 52.50	2.4877	N.14 57 15.1	9.236
1	7 48 6.38	2.5379	19 58 9.0	3.295	1	9 49 21.68	2.4850	14 47 57.8	9.340
2	7 50 38.68	2.5387	19 54 47.1	3.434	2	9 51 50.70	2.4823	14 38 34.3	9.443
3	7 53 11.03	2.5395	19 51 16.9	3.573	3	9 54 19.56	2.4796	14 29 4.7	9.544
4	7 55 43.42	2.5402	19 47 38.4	3.712	4	9 56 48.25	2.4768	14 19 29.0	9.644
5	7 58 15.85	2.5408	19 43 51.6	3.850	5	9 59 16.77	2.4740	14 9 47.4	9.743
6	8 0 48.32	2.5413	19 39 58.4	3.988	6	10 1 45.13	2.4712	13 59 59.9	9.840
7	8 3 20.82	2.5418	19 35 53.0	4.126	7	10 4 13.32	2.4683	13 50 6.6	9.936
8	8 5 53.34	2.5421	19 31 41.3	4.264	8	10 6 41.33	2.4654	13 40 7.6	10.030
9	8 8 25.87	2.5424	19 27 21.4	4.401	9	10 9 9.17	2.4625	13 30 3.0	10.123
10	8 10 58.42	2.5425	19 22 53.2	4.538	10	10 11 36.83	2.4596	13 19 52.8	10.215
11	8 13 30.98	2.5425	19 18 16.8	4.674	11	10 14 4.37	2.4567	13 9 37.1	10.306
12	8 16 3.53	2.5424	19 13 32.3	4.811	12	10 16 31.63	2.4537	12 59 16.1	10.395
13	8 18 36.07	2.5423	19 8 39.6	4.947	13	10 18 58.76	2.4507	12 48 49.8	10.482
14	8 21 8.60	2.5421	19 3 38.7	5.083	14	10 21 25.71	2.4477	12 38 18.3	10.568
15	8 23 41.11	2.5417	18 58 29.7	5.218	15	10 23 52.48	2.4446	12 27 41.7	10.653
16	8 26 13.60	2.5413	18 53 12.6	5.352	16	10 26 19.06	2.4416	12 17 0.0	10.736
17	8 28 46.07	2.5408	18 47 47.5	5.486	17	10 28 45.46	2.4385	12 6 13.4	10.818
18	8 31 18.10	2.5402	18 42 14.3	5.619	18	10 31 11.67	2.4355	11 55 21.9	10.898
19	8 33 50.89	2.5395	18 36 33.2	5.752	19	10 33 37.69	2.4324	11 44 25.7	10.976
20	8 36 23.24	2.5387	18 30 44.1	5.884	20	10 36 3.53	2.4293	11 33 24.8	11.053
21	8 38 55.54	2.5378	18 24 47.1	6.016	21	10 38 29.19	2.4262	11 22 19.3	11.128
22	8 41 27.78	2.5369	18 18 42.2	6.147	22	10 40 54.67	2.4231	11 11 9.4	11.202
23	8 43 59.97	2.5359	18 12 29.5	6.277	23	10 43 19.96	2.4200	10 59 55.1	11.275
24	8 46 32.09	2.5348	N.18 6 9.0	6.406	24	10 45 45.07	2.4169	N.10 48 36.4	11.346

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 9.					WEDNESDAY 11.				
0	<sup>h</sup> 10 <sup>m</sup> 45 <sup>s</sup> 45.07	2.4169	N. 10° 48' 36.4"	11.346	0	<sup>h</sup> 12 <sup>m</sup> 38 <sup>s</sup> 26.57	2.9891	N. 0° 52' 4.3"	12.914
1	10 48 9.98	2.4137	10 37 13.5	11.415	1	12 40 43.86	2.9873	0 39 9.6	12.909
2	10 50 34.71	2.4108	10 25 46.6	11.483	2	12 43 1.04	2.9855	0 26 15.2	12.903
3	10 52 59.25	2.4075	10 14 15.6	11.549	3	12 45 18.11	2.9837	0 13 21.2	12.896
4	10 55 23.60	2.4044	10 2 40.7	11.614	4	12 47 35.08	2.9820	N. 0 0 27.7	12.887
5	10 57 47.77	2.4013	9 51 1.9	11.677	5	12 49 51.95	2.9803	S. 0 12 25.2	12.877
6	11 0 11.76	2.3982	9 39 19.4	11.738	6	12 52 8.71	2.9786	0 25 17.5	12.866
7	11 2 35.56	2.3951	9 27 33.3	11.798	7	12 54 25.38	2.9770	0 38 9.1	12.853
8	11 4 59.17	2.3920	9 15 43.6	11.857	8	12 56 41.95	2.9755	0 50 59.8	12.839
9	11 7 22.60	2.3889	9 3 50.4	11.914	9	12 58 58.43	2.9740	1 3 49.6	12.823
10	11 9 45.84	2.3858	8 51 53.9	11.969	10	13 1 14.83	2.9726	1 16 38.5	12.806
11	11 12 8.90	2.3828	8 39 54.1	12.023	11	13 3 31.15	2.9712	1 29 26.3	12.788
12	11 14 31.78	2.3798	8 27 51.1	12.075	12	13 5 47.38	2.9698	1 42 13.0	12.768
13	11 16 54.48	2.3768	8 15 45.1	12.126	13	13 8 3.52	2.9684	1 54 58.4	12.746
14	11 19 17.00	2.3738	8 3 36.0	12.175	14	13 10 19.59	2.9673	2 7 42.5	12.723
15	11 21 39.34	2.3708	7 51 24.0	12.223	15	13 12 35.59	2.9660	2 20 25.2	12.700
16	11 24 1.50	2.3678	7 39 9.3	12.268	16	13 14 51.51	2.9648	2 33 6.5	12.676
17	11 26 23.48	2.3649	7 26 51.9	12.319	17	13 17 7.36	2.9637	2 45 46.3	12.650
18	11 28 45.29	2.3620	7 14 31.9	12.355	18	13 19 23.15	2.9626	2 58 24.5	12.622
19	11 31 6.92	2.3591	7 2 9.4	12.386	19	13 21 38.87	2.9615	3 11 0.9	12.593
20	11 33 28.38	2.3562	6 49 44.4	12.435	20	13 23 54.53	2.9605	3 23 35.6	12.563
21	11 35 49.67	2.3534	6 37 17.1	12.473	21	13 26 10.13	2.9595	3 36 8.5	12.532
22	11 38 10.79	2.3506	6 24 47.6	12.500	22	13 28 25.67	2.9585	3 48 39.4	12.499
23	11 40 31.74	2.3478	N. 6 12 16.0	12.544	23	13 30 41.15	2.9576	S. 4 1 8.3	12.465
TUESDAY 10.					THURSDAY 12.				
0	11 42 52.53	2.3450	N. 5 59 42.3	12.577	0	13 32 56.58	2.9567	S. 4 13 35.2	12.430
1	11 45 13.15	2.3423	5 47 6.7	12.609	1	13 35 11.96	2.9559	4 26 0.0	12.394
2	11 47 33.60	2.3396	5 34 29.2	12.639	2	13 37 27.30	2.9552	4 38 22.5	12.357
3	11 49 53.90	2.3370	5 21 50.0	12.668	3	13 39 42.59	2.9545	4 50 42.7	12.318
4	11 52 14.04	2.3344	5 9 9.1	12.695	4	13 41 57.84	2.9539	5 3 0.6	12.278
5	11 54 34.02	2.3318	4 56 26.6	12.720	5	13 44 13.05	2.9533	5 15 16.1	12.237
6	11 56 53.85	2.3292	4 43 42.7	12.744	6	13 46 28.23	2.9527	5 27 29.0	12.195
7	11 59 13.52	2.3266	4 30 57.4	12.766	7	13 48 43.37	2.9522	5 39 39.4	12.151
8	12 1 33.04	2.3241	4 18 10.8	12.787	8	13 50 58.48	2.9517	5 51 47.1	12.106
9	12 3 52.41	2.3216	4 5 23.0	12.806	9	13 53 13.56	2.9512	6 3 52.1	12.061
10	12 6 11.63	2.3192	3 52 34.1	12.823	10	13 55 28.62	2.9507	6 15 54.4	12.015
11	12 8 30.71	2.3168	3 39 44.2	12.839	11	13 57 43.65	2.9503	6 27 53.9	11.967
12	12 10 49.65	2.3144	3 26 53.4	12.854	12	13 59 58.65	2.9499	6 39 50.4	11.918
13	12 13 8.44	2.3121	3 14 1.7	12.867	13	14 2 13.63	2.9496	6 51 44.0	11.867
14	12 15 27.10	2.3098	3 1 9.3	12.878	14	14 4 28.60	2.9493	7 3 34.5	11.815
15	12 17 45.62	2.3076	2 48 16.3	12.888	15	14 6 43.55	2.9491	7 15 21.9	11.763
16	12 20 4.01	2.3054	2 35 22.7	12.897	16	14 8 58.49	2.9489	7 27 6.1	11.710
17	12 22 22.26	2.3032	2 22 28.6	12.904	17	14 11 13.42	2.9487	7 38 47.1	11.656
18	12 24 40.39	2.3010	2 9 34.2	12.910	18	14 13 28.34	2.9486	7 50 24.8	11.600
19	12 26 58.39	2.2989	1 56 39.5	12.914	19	14 15 43.25	2.9485	8 1 59.1	11.543
20	12 29 16.26	2.2969	1 43 44.5	12.917	20	14 17 58.16	2.9484	8 13 30.0	11.485
21	12 31 34.01	2.2949	1 30 49.4	12.918	21	14 20 13.06	2.9484	8 24 57.4	11.427
22	12 33 51.65	2.2929	1 17 54.3	12.918	22	14 22 27.96	2.9484	8 36 21.3	11.368
23	12 36 9.17	2.2910	1 4 59.2	12.917	23	14 24 42.86	2.9484	8 47 41.6	11.307
24	12 38 26.57	2.2891	N. 0 52 4.3	12.914	24	14 26 57.77	2.9485	S. 8 58 58.2	11.245



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 13.					SUNDAY 15.				
0	14 26 57.77	2.9485	S. 8° 58' 58.2	11.945	0	16 15 24.86	2.2752	S. 16° 30' 48.6	7.283
1	14 29 12.68	2.9486	9 10 11.0	11.183	1	16 17 41.39	2.2759	16 38 2.6	7.184
2	14 31 27.60	2.9487	9 21 20.1	11.190	2	16 19 57.96	2.2766	16 45 10.7	7.084
3	14 33 42.53	2.9489	9 32 25.4	11.055	3	16 22 14.57	2.2772	16 52 12.7	6.983
4	14 35 57.47	2.9491	9 43 26.7	10.989	4	16 24 31.22	2.2779	16 59 8.7	6.882
5	14 38 12.42	2.9493	9 54 24.1	10.923	5	16 26 47.91	2.2785	17 5 58.6	6.780
6	14 40 27.39	2.9495	10 5 17.4	10.856	6	16 29 4.64	2.2791	17 12 42.3	6.678
7	14 42 42.37	2.9498	10 16 6.7	10.787	7	16 31 21.40	2.2797	17 19 19.9	6.576
8	14 44 57.37	2.2501	10 26 51.8	10.717	8	16 33 38.20	2.2803	17 25 51.4	6.473
9	14 47 12.39	2.2505	10 37 32.7	10.647	9	16 35 55.03	2.2808	17 32 16.7	6.369
10	14 49 27.43	2.2509	10 48 9.4	10.576	10	16 38 11.90	2.2813	17 38 35.7	6.265
11	14 51 42.50	2.2513	10 58 41.8	10.503	11	16 40 28.79	2.2818	17 44 48.4	6.160
12	14 53 57.59	2.2517	11 9 9.8	10.430	12	16 42 45.71	2.2823	17 50 54.9	6.055
13	14 56 12.71	2.2521	11 19 33.4	10.357	13	16 45 2.66	2.2828	17 56 55.1	5.950
14	14 58 27.85	2.2525	11 29 52.6	10.282	14	16 47 19.64	2.2833	18 2 48.9	5.845
15	15 0 43.02	2.2530	11 40 7.2	10.206	15	16 49 36.65	2.2838	18 8 36.4	5.739
16	15 2 58.21	2.2535	11 50 17.3	10.129	16	16 51 53.69	2.2842	18 14 17.6	5.633
17	15 5 13.43	2.2540	12 0 22.8	10.052	17	16 54 10.75	2.2846	18 19 52.4	5.526
18	15 7 28.69	2.2545	12 10 23.6	9.974	18	16 56 27.84	2.2850	18 25 20.7	5.419
19	15 9 43.98	2.2551	12 20 19.7	9.896	19	16 58 44.95	2.2853	18 30 42.6	5.311
20	15 11 59.30	2.2557	12 30 11.0	9.815	20	17 1 2.07	2.2856	18 35 58.0	5.203
21	15 14 14.66	2.2563	12 39 57.5	9.735	21	17 3 19.21	2.2858	18 41 7.0	5.095
22	15 16 30.06	2.2569	12 49 39.2	9.654	22	17 5 36.37	2.2861	18 46 9.4	4.987
23	15 18 45.50	2.2576	S. 12° 59' 15.9	9.571	23	17 7 53.54	2.2863	S. 18° 51' 5.3	4.878
SATURDAY 14.					MONDAY 16.				
0	15 21 0.97	2.2582	S. 13° 8' 47.7	9.488	0	17 10 10.73	2.2865	S. 18° 55' 54.7	4.769
1	15 23 16.48	2.2589	13 18 14.5	9.404	1	17 12 27.93	2.2867	19 0 37.5	4.659
2	15 25 32.03	2.2595	13 27 36.2	9.319	2	17 14 45.13	2.2868	19 5 13.8	4.549
3	15 27 47.62	2.2602	13 36 52.8	9.234	3	17 17 2.34	2.2869	19 9 43.5	4.439
4	15 30 3.25	2.2608	13 46 4.3	9.148	4	17 19 19.56	2.2870	19 14 6.5	4.329
5	15 32 18.92	2.2615	13 55 10.6	9.061	5	17 21 36.78	2.2870	19 18 22.9	4.218
6	15 34 34.63	2.2622	14 4 11.6	8.973	6	17 23 54.00	2.2870	19 22 32.7	4.108
7	15 36 50.38	2.2629	14 13 7.4	8.885	7	17 26 11.22	2.2869	19 26 35.9	3.998
8	15 39 6.18	2.2636	14 21 57.8	8.796	8	17 28 28.43	2.2868	19 30 32.4	3.887
9	15 41 22.02	2.2643	14 30 42.8	8.706	9	17 30 45.64	2.2867	19 34 22.3	3.776
10	15 43 37.90	2.2650	14 39 22.5	8.616	10	17 33 2.84	2.2866	19 38 5.5	3.665
11	15 45 53.83	2.2658	14 47 56.8	8.525	11	17 35 20.03	2.2864	19 41 42.0	3.553
12	15 48 9.80	2.2665	14 56 25.5	8.433	12	17 37 37.21	2.2862	19 45 11.8	3.441
13	15 50 25.82	2.2673	15 4 48.7	8.341	13	17 39 54.37	2.2859	19 48 34.9	3.329
14	15 52 41.88	2.2680	15 13 6.4	8.248	14	17 42 11.52	2.2856	19 51 51.3	3.217
15	15 54 57.98	2.2688	15 21 18.5	8.155	15	17 44 28.65	2.2853	19 55 1.0	3.105
16	15 57 14.13	2.2695	15 29 24.9	8.061	16	17 46 45.75	2.2849	19 58 3.9	2.993
17	15 59 30.32	2.2702	15 37 25.6	7.965	17	17 49 2.83	2.2844	20 1 0.1	2.881
18	16 1 46.55	2.2709	15 45 20.6	7.869	18	17 51 19.88	2.2839	20 3 49.6	2.769
19	16 4 2.83	2.2717	15 53 9.8	7.771	19	17 53 36.90	2.2834	20 6 32.4	2.657
20	16 6 19.15	2.2724	16 0 53.3	7.676	20	17 55 53.89	2.2829	20 9 8.4	2.545
21	16 8 35.52	2.2731	16 8 30.9	7.579	21	17 58 10.85	2.2823	20 11 37.7	2.432
22	16 10 51.92	2.2738	16 16 2.7	7.481	22	18 0 27.77	2.2817	20 14 0.2	2.320
23	16 13 8.37	2.2745	16 23 28.6	7.382	23	18 2 44.65	2.2810	20 16 16.0	2.207
24	16 15 24.86	2.2752	S. 16° 30' 48.6	7.283	24	18 5 1.49	2.2803	S. 20° 18' 25.0	2.095

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 17.					THURSDAY 19.				
0	18 <sup>h</sup> 5 <sup>m</sup> 1.49	2.2803	S. 20° 18' 25.0"	2.095	0	19 <sup>h</sup> 52' 47.57	2.1938	S. 19° 52' 8.2"	3.079
1	18 7 18.28	2.2795	20 20 27.3	1.982	1	19 54 59.11	2.1910	19 49 0.5	3.178
2	18 9 35.03	2.2787	20 22 22.8	1.869	2	19 57 10.49	2.1882	19 45 46.8	3.276
3	18 11 51.73	2.2778	20 24 11.6	1.757	3	19 59 21.70	2.1854	19 42 27.2	3.374
4	18 14 8.37	2.2769	20 25 53.6	1.644	4	20 1 32.74	2.1826	19 39 1.9	3.471
5	18 16 24.96	2.2759	20 27 28.9	1.532	5	20 3 43.62	2.1797	19 35 30.8	3.567
6	18 18 41.48	2.2749	20 28 57.4	1.420	6	20 5 54.31	2.1768	19 31 53.9	3.663
7	18 20 57.94	2.2738	20 30 19.2	1.308	7	20 8 4.83	2.1738	19 28 11.3	3.758
8	18 23 14.34	2.2727	20 31 34.3	1.195	8	20 10 15.17	2.1709	19 24 22.9	3.853
9	18 25 30.68	2.2716	20 32 42.7	1.083	9	20 12 25.34	2.1679	19 20 28.8	3.948
10	18 27 46.95	2.2705	20 33 44.3	0.971	10	20 14 35.32	2.1649	19 16 29.1	4.042
11	18 30 3.15	2.2693	20 34 39.2	0.859	11	20 16 45.12	2.1618	19 12 23.8	4.135
12	18 32 19.27	2.2680	20 35 27.4	0.748	12	20 18 54.73	2.1588	19 8 12.9	4.227
13	18 34 35.32	2.2667	20 36 8.9	0.637	13	20 21 4.16	2.1557	19 3 56.5	4.319
14	18 36 51.28	2.2653	20 36 43.8	0.525	14	20 23 13.41	2.1526	18 59 34.6	4.411
15	18 39 7.16	2.2639	20 37 12.0	0.414	15	20 25 22.47	2.1495	18 55 7.2	4.502
16	18 41 22.95	2.2625	20 37 33.5	0.303	16	20 27 31.35	2.1464	18 50 34.4	4.592
17	18 43 38.65	2.2610	20 37 48.4	0.193	17	20 29 40.04	2.1433	18 45 56.2	4.681
18	18 45 54.27	2.2595	20 37 56.7	0.083	18	20 31 48.54	2.1401	18 41 12.7	4.770
19	18 48 9.79	2.2579	20 37 58.4	0.027	19	20 33 56.85	2.1369	18 36 23.9	4.858
20	18 50 25.22	2.2563	20 37 53.4	0.137	20	20 36 4.97	2.1337	18 31 29.8	4.946
21	18 52 40.55	2.2546	20 37 41.8	0.247	21	20 38 12.89	2.1304	18 26 30.5	5.033
22	18 54 55.77	2.2529	20 37 23.7	0.357	22	20 40 20.62	2.1271	18 21 25.9	5.119
23	18 57 10.88	2.2511	S. 20 36 59.0	0.466	23	20 42 28.15	2.1238	S. 18 16 16.2	5.204
WEDNESDAY 18.					FRIDAY 20.				
0	18 59 25.89	2.2493	S. 20 36 27.8	0.575	0	20 44 35.48	2.1206	S. 18 11 1.4	5.289
1	19 1 40.80	2.2474	20 35 50.0	0.684	1	20 46 42.02	2.1173	18 5 41.5	5.373
2	19 3 55.59	2.2455	20 35 5.7	0.792	2	20 48 49.56	2.1141	18 0 16.6	5.457
3	19 6 10.26	2.2436	20 34 14.9	0.900	3	20 50 56.31	2.1108	17 54 46.7	5.540
4	19 8 24.82	2.2416	20 33 17.7	1.008	4	20 53 2.86	2.1075	17 49 11.8	5.622
5	19 10 39.26	2.2396	20 32 14.0	1.115	5	20 55 9.21	2.1042	17 43 32.0	5.704
6	19 12 53.57	2.2375	20 31 3.9	1.222	6	20 57 15.36	2.1009	17 37 47.3	5.785
7	19 15 7.76	2.2354	20 29 47.3	1.329	7	20 59 21.31	2.0975	17 31 57.8	5.865
8	19 17 21.82	2.2333	20 28 24.4	1.435	8	21 1 27.06	2.0942	17 26 3.5	5.944
9	19 19 35.75	2.2311	20 26 55.1	1.541	9	21 3 32.61	2.0908	17 20 4.4	6.023
10	19 21 49.55	2.2289	20 25 19.5	1.647	10	21 5 37.96	2.0875	17 14 0.7	6.101
11	19 24 3.22	2.2267	20 23 37.6	1.752	11	21 7 43.11	2.0842	17 7 52.3	6.178
12	19 26 16.75	2.2244	20 21 49.3	1.857	12	21 9 48.06	2.0809	17 1 39.3	6.255
13	19 28 30.14	2.2220	20 19 54.7	1.961	13	21 11 52.81	2.0775	16 55 21.7	6.332
14	19 30 43.39	2.2196	20 17 53.9	2.065	14	21 13 57.36	2.0741	16 48 59.5	6.407
15	19 32 56.49	2.2172	20 15 46.9	2.168	15	21 16 1.70	2.0707	16 42 32.8	6.482
16	19 35 9.45	2.2147	20 13 33.7	2.271	16	21 18 5.84	2.0673	16 36 1.7	6.556
17	19 37 22.26	2.2122	20 11 14.3	2.374	17	21 20 9.78	2.0640	16 29 26.1	6.629
18	19 39 34.91	2.2097	20 8 48.8	2.476	18	21 22 13.52	2.0606	16 22 46.2	6.701
19	19 41 47.41	2.2071	20 6 17.2	2.578	19	21 24 17.06	2.0573	16 16 1.9	6.773
20	19 43 59.76	2.2045	20 3 39.4	2.679	20	21 26 20.40	2.0539	16 9 13.4	6.844
21	19 46 11.95	2.2019	20 0 55.6	2.780	21	21 28 23.53	2.0506	16 2 20.6	6.914
22	19 48 23.99	2.1992	19 58 5.8	2.880	22	21 30 26.47	2.0473	15 55 23.7	6.984
23	19 50 35.86	2.1965	19 55 10.0	2.980	23	21 32 29.21	2.0440	15 48 22.6	7.053
24	19 52 47.57	2.1938	S. 19 52 8.2	3.079	24	21 34 31.75	2.0406	S. 15 41 17.3	7.121

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 21.					MONDAY 23.				
0	21 <sup>h</sup> 34 <sup>m</sup> 31.75	2.0406	S. 15° 41' 17.3	7.121	0	23 <sup>h</sup> 8 <sup>m</sup> 57.17	1.9027	S. 8° 54' 38.5	9.546
1	21 36 34.09	2.0373	15 34 8.0	7.188	1	23 10 51.27	1.9005	8 45 4.6	9.581
2	21 38 36.23	2.0340	15 26 54.7	7.255	2	23 12 45.23	1.8983	8 35 28.8	9.614
3	21 40 38.17	2.0308	15 19 37.4	7.322	3	23 14 39.06	1.8962	8 25 51.0	9.646
4	21 42 39.92	2.0275	15 12 16.1	7.388	4	23 16 32.77	1.8941	8 16 11.3	9.677
5	21 44 41.47	2.0242	15 4 50.9	7.453	5	23 18 26.36	1.8921	8 6 29.8	9.708
6	21 46 42.82	2.0209	14 57 21.9	7.515	6	23 20 19.82	1.8900	7 56 46.4	9.738
7	21 48 43.98	2.0177	14 49 49.1	7.578	7	23 22 13.16	1.8880	7 47 1.3	9.767
8	21 50 44.94	2.0144	14 42 12.5	7.640	8	23 24 6.38	1.8861	7 37 14.4	9.795
9	21 52 45.71	2.0112	14 34 32.2	7.702	9	23 25 59.49	1.8842	7 27 25.8	9.823
10	21 54 46.28	2.0080	14 26 48.2	7.763	10	23 27 52.49	1.8824	7 17 35.6	9.851
11	21 56 46.66	2.0048	14 19 0.6	7.824	11	23 29 45.38	1.8806	7 7 43.7	9.878
12	21 58 46.85	2.0016	14 11 9.3	7.884	12	23 31 38.16	1.8788	6 57 50.3	9.904
13	22 0 46.85	1.9985	14 3 14.5	7.943	13	23 33 30.84	1.8771	6 47 55.3	9.929
14	22 2 46.66	1.9953	13 55 16.3	8.000	14	23 35 23.41	1.8754	6 37 58.8	9.953
15	22 4 46.28	1.9922	13 47 14.6	8.057	15	23 37 15.88	1.8737	6 28 0.8	9.977
16	22 6 45.72	1.9891	13 39 9.5	8.114	16	23 39 8.25	1.8720	6 18 1.5	10.000
17	22 8 44.97	1.9860	13 31 1.0	8.170	17	23 41 0.52	1.8704	6 8 0.8	10.023
18	22 10 44.04	1.9829	13 22 49.1	8.225	18	23 42 52.70	1.8689	5 57 58.7	10.045
19	22 12 42.92	1.9799	13 14 34.0	8.279	19	23 44 44.79	1.8674	5 47 55.3	10.067
20	22 14 41.62	1.9768	13 6 15.6	8.333	20	23 46 36.79	1.8660	5 37 50.6	10.088
21	22 16 40.14	1.9738	12 57 54.0	8.386	21	23 48 28.71	1.8646	5 27 44.7	10.108
22	22 18 38.47	1.9708	12 49 29.3	8.438	22	23 50 20.54	1.8632	5 17 37.6	10.128
23	22 20 36.63	1.9678	S. 12° 41' 1.5	8.490	23	23 52 12.29	1.8619	S. 5° 7' 29.4	10.147
SUNDAY 22.					TUESDAY 24.				
0	22 22 34.61	1.9648	S. 12° 32' 30.5	8.541	0	23 54 3.97	1.8606	S. 4° 57' 20.0	10.165
1	22 24 32.41	1.9619	12 23 56.5	8.591	1	23 55 55.57	1.8594	4 47 9.6	10.183
2	22 26 30.04	1.9590	12 15 19.6	8.640	2	23 57 47.10	1.8582	4 36 58.1	10.200
3	22 28 27.50	1.9562	12 6 39.8	8.688	3	23 59 38.55	1.8570	4 26 45.6	10.217
4	22 30 24.79	1.9534	11 57 57.0	8.736	4	0 1 29.94	1.8559	4 16 32.1	10.232
5	22 32 21.91	1.9506	11 49 11.4	8.783	5	0 3 21.26	1.8548	4 6 17.7	10.247
6	22 34 18.86	1.9478	11 40 23.0	8.830	6	0 5 12.51	1.8538	3 56 2.4	10.261
7	22 36 15.64	1.9450	11 31 31.8	8.876	7	0 7 3.71	1.8528	3 45 46.3	10.277
8	22 38 12.26	1.9423	11 22 37.9	8.921	8	0 8 54.85	1.8518	3 35 29.4	10.289
9	22 40 8.72	1.9396	11 13 41.3	8.966	9	0 10 45.93	1.8509	3 25 11.7	10.302
10	22 42 5.01	1.9369	11 4 42.0	9.009	10	0 12 36.96	1.8500	3 14 53.2	10.314
11	22 44 1.14	1.9342	10 55 40.1	9.052	11	0 14 27.94	1.8492	3 4 34.0	10.325
12	22 45 57.11	1.9316	10 46 35.7	9.094	12	0 16 18.87	1.8484	2 54 14.2	10.336
13	22 47 52.93	1.9290	10 37 28.8	9.136	13	0 18 9.76	1.8477	2 43 53.7	10.346
14	22 49 48.59	1.9264	10 28 19.4	9.177	14	0 20 0.60	1.8471	2 33 32.7	10.355
15	22 51 44.10	1.9239	10 19 7.6	9.217	15	0 21 51.41	1.8465	2 23 11.1	10.364
16	22 53 39.46	1.9214	10 9 53.4	9.257	16	0 23 42.19	1.8460	2 12 49.0	10.373
17	22 55 34.68	1.9190	10 0 36.8	9.296	17	0 25 32.93	1.8455	2 2 26.4	10.381
18	22 57 29.75	1.9166	9 51 17.9	9.334	18	0 27 23.64	1.8450	1 52 3.3	10.388
19	22 59 24.67	1.9142	9 41 56.8	9.371	19	0 29 14.32	1.8446	1 41 39.8	10.394
20	23 1 19.45	1.9118	9 32 33.4	9.407	20	0 31 4.98	1.8442	1 31 16.0	10.400
21	23 3 14.08	1.9095	9 23 7.9	9.443	21	0 32 55.61	1.8438	1 20 51.8	10.406
22	23 5 8.58	1.9072	9 13 40.2	9.479	22	0 34 46.23	1.8435	1 10 27.3	10.411
23	23 7 2.94	1.9049	9 4 10.4	9.514	23	0 36 36.83	1.8433	1 0 2.5	10.415
24	23 8 57.17	1.9027	S. 8° 54' 38.5	9.548	24	0 38 27.42	1.8431	S. 0° 49' 37.5	10.418

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 25.					FRIDAY 27.				
0	0 38 27.42	1.8431	S. 0° 49' 37.5"	10.418	0	2 7 36.54	1.8908	N. 7° 23' 14.2"	9.887
1	0 40 18.00	1.8429	0 39 12.3	10.421	1	2 9 30.04	1.8930	7° 33' 6.6"	9.861
2	0 42 8.57	1.8428	0 28 47.0	10.423	2	2 11 23.68	1.8952	7 42 57.5	9.834
3	0 43 59.13	1.8427	0 18 21.5	10.425	3	2 13 17.46	1.8975	7 52 46.8	9.807
4	0 45 49.69	1.8427	S. 0 7 56.0	10.426	4	2 15 11.38	1.8999	8 2 34.4	9.779
5	0 47 40.25	1.8427	N. 0 2 29.6	10.427	5	2 17 5.44	1.9023	8 12 20.3	9.751
6	0 49 30.81	1.8428	0 12 55.3	10.427	6	2 18 59.65	1.9047	8 22 4.5	9.722
7	0 51 21.38	1.8429	0 23 20.9	10.427	7	2 20 54.00	1.9072	8 31 46.9	9.692
8	0 53 11.96	1.8431	0 33 46.5	10.426	8	2 22 48.51	1.9097	8 41 27.5	9.661
9	0 55 2.55	1.8433	0 44 12.0	10.423	9	2 24 43.17	1.9123	8 51 6.2	9.630
10	0 56 53.16	1.8436	0 54 37.3	10.420	10	2 26 37.99	1.9150	9 0 43.1	9.598
11	0 58 43.79	1.8439	1 5 2.5	10.417	11	2 28 32.97	1.9177	9 10 18.0	9.566
12	1 0 34.43	1.8443	1 15 27.4	10.414	12	2 30 28.11	1.9205	9 19 51.0	9.533
13	1 2 25.10	1.8447	1 25 52.1	10.410	13	2 32 23.42	1.9233	9 29 22.0	9.499
14	1 4 15.79	1.8452	1 36 16.6	10.405	14	2 34 18.90	1.9261	9 38 50.9	9.464
15	1 6 6.51	1.8457	1 46 40.8	10.400	15	2 36 14.55	1.9290	9 48 17.7	9.429
16	1 7 57.27	1.8463	1 57 4.6	10.394	16	2 38 10.38	1.9319	9 57 42.4	9.393
17	1 9 48.06	1.8469	2 7 28.1	10.388	17	2 40 6.38	1.9349	10 7 4.9	9.357
18	1 11 38.90	1.8476	2 17 51.2	10.381	18	2 42 2.56	1.9379	10 16 25.2	9.320
19	1 13 29.78	1.8483	2 28 13.8	10.373	19	2 43 58.93	1.9410	10 25 43.2	9.282
20	1 15 20.70	1.8490	2 38 36.0	10.365	20	2 45 55.48	1.9441	10 34 59.0	9.243
21	1 17 11.66	1.8498	2 48 57.6	10.354	21	2 47 52.22	1.9473	10 44 12.4	9.204
22	1 19 2.68	1.8507	2 59 18.7	10.344	22	2 49 49.16	1.9505	10 53 23.5	9.164
23	1 20 53.75	1.8516	N. 3 9 39.2	10.336	23	2 51 46.29	1.9537	N. 11 2 32.2	9.124
THURSDAY 26.					SATURDAY 28.				
0	1 22 44.87	1.8526	N. 3 19 59.0	10.325	0	2 53 43.61	1.9570	N. 11 11 38.4	9.083
1	1 24 36.06	1.8536	3 30 18.2	10.314	1	2 55 41.13	1.9604	11 20 42.1	9.041
2	1 26 27.31	1.8547	3 40 36.7	10.302	2	2 57 38.86	1.9638	11 29 43.3	8.998
3	1 28 18.62	1.8558	3 50 54.5	10.290	3	2 59 36.80	1.9673	11 38 41.9	8.954
4	1 30 10.00	1.8569	4 1 11.5	10.277	4	3 1 34.94	1.9708	11 47 37.8	8.910
5	1 32 1.45	1.8581	4 11 27.7	10.263	5	3 3 33.29	1.9743	11 56 31.1	8.865
6	1 33 52.97	1.8594	4 21 43.0	10.248	6	3 5 31.86	1.9779	12 5 21.6	8.819
7	1 35 44.57	1.8607	4 31 57.5	10.233	7	3 7 30.64	1.9815	12 14 9.4	8.773
8	1 37 36.25	1.8621	4 42 11.0	10.218	8	3 9 29.64	1.9852	12 22 54.4	8.726
9	1 39 28.02	1.8635	4 52 23.6	10.202	9	3 11 28.87	1.9890	12 31 36.5	8.678
10	1 41 19.87	1.8650	5 2 35.2	10.185	10	3 13 28.32	1.9927	12 40 15.8	8.629
11	1 43 11.81	1.8665	5 12 45.8	10.168	11	3 15 28.00	1.9965	12 48 52.1	8.580
12	1 45 3.85	1.8681	5 22 55.4	10.150	12	3 17 27.90	2.0003	12 57 25.4	8.530
13	1 46 55.98	1.8697	5 33 3.9	10.132	13	3 19 28.03	2.0042	13 5 55.7	8.479
14	1 48 48.21	1.8714	5 43 11.3	10.113	14	3 21 28.40	2.0081	13 14 22.9	8.426
15	1 50 40.54	1.8731	5 53 17.5	10.093	15	3 23 29.01	2.0121	13 22 47.0	8.376
16	1 52 32.98	1.8748	6 3 22.4	10.073	16	3 25 29.85	2.0161	13 31 8.0	8.323
17	1 54 25.52	1.8766	6 13 26.1	10.051	17	3 27 30.93	2.0201	13 39 25.8	8.269
18	1 56 18.16	1.8784	6 23 28.5	10.029	18	3 29 32.26	2.0242	13 47 40.3	8.214
19	1 58 10.92	1.8803	6 33 29.6	10.007	19	3 31 33.84	2.0283	13 55 51.5	8.158
20	2 0 3.79	1.8823	6 43 29.4	9.984	20	3 33 35.67	2.0325	14 3 59.3	8.102
21	2 1 56.79	1.8843	6 53 27.8	9.961	21	3 35 37.74	2.0367	14 12 3.8	8.046
22	2 3 49.91	1.8864	7 3 24.7	9.937	22	3 37 40.06	2.0409	14 20 4.8	7.988
23	2 5 43.16	1.8886	7 13 20.2	9.912	23	3 39 42.64	2.0452	14 28 2.3	7.929
24	2 7 36.54	1.8908	N. 7 23 14.2	9.887	24	3 41 45.47	2.0495	N. 14 35 56.3	7.869

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 29.					TUESDAY 31.				
0	3 <sup>h</sup> 41 <sup>m</sup> 45.47 <sup>s</sup>	2.0495	N.14° 35' 56.3"	7.869	0	5 <sup>h</sup> 25 <sup>m</sup> 33.49 <sup>s</sup>	2.2809	N.19° 29' 7.0"	4.006
1	3 43 48.56	2.0538	14 43 46.7	7.800	1	5 27 50.48	2.2857	19 33 4.4	3.906
2	3 45 51.92	2.0581	14 51 33.4	7.748	2	5 30 7.77	2.2906	19 36 55.7	3.803
3	3 47 55.54	2.0625	14 59 16.5	7.687	3	5 32 25.35	2.2954	19 40 40.7	3.698
4	3 49 59.42	2.0669	15 6 55.8	7.624	4	5 34 43.22	2.3003	19 44 19.5	3.593
5	3 52 3.57	2.0713	15 14 31.3	7.560	5	5 37 1.37	2.3051	19 47 52.0	3.488
6	3 54 7.98	2.0758	15 22 3.0	7.496	6	5 39 19.82	2.3099	19 51 18.1	3.382
7	3 56 12.67	2.0804	15 29 30.8	7.431	7	5 41 38.56	2.3147	19 54 37.8	3.274
8	3 58 17.63	2.0850	15 36 54.7	7.365	8	5 43 57.58	2.3195	19 57 51.0	3.166
9	4 0 22.87	2.0896	15 44 14.6	7.298	9	5 46 16.89	2.3242	20 0 57.7	3.057
10	4 2 28.38	2.0942	15 51 30.4	7.230	10	5 48 36.48	2.3289	20 3 57.8	2.947
11	4 4 34.17	2.0988	15 58 42.2	7.162	11	5 50 56.36	2.3336	20 6 51.3	2.837
12	4 6 40.23	2.1034	16 5 49.8	7.093	12	5 53 16.51	2.3382	20 9 38.2	2.726
13	4 8 46.57	2.1081	16 12 53.3	7.023	13	5 55 36.94	2.3428	20 12 18.4	2.613
14	4 10 53.20	2.1128	16 19 52.5	6.952	14	5 57 57.65	2.3474	20 14 51.7	2.499
15	4 13 0.11	2.1176	16 26 47.4	6.879	15	6 0 18.63	2.3519	20 17 18.2	2.385
16	4 15 7.31	2.1224	16 33 38.0	6.806	16	6 2 39.88	2.3564	20 19 37.9	2.270
17	4 17 14.80	2.1272	16 40 24.2	6.733	17	6 5 1.40	2.3609	20 21 50.6	2.154
18	4 19 22.57	2.1320	16 47 5.9	6.659	18	6 7 23.19	2.3654	20 23 56.4	2.038
19	4 21 30.63	2.1368	16 53 43.2	6.583	19	6 9 45.24	2.3698	20 25 55.2	1.921
20	4 23 38.98	2.1416	17 0 15.9	6.506	20	6 12 7.56	2.3741	20 27 46.9	1.803
21	4 25 47.63	2.1465	17 6 44.0	6.429	21	6 14 30.13	2.3784	20 29 31.5	1.684
22	4 27 56.57	2.1513	17 13 7.4	6.351	22	6 16 52.95	2.3826	20 31 9.0	1.564
23	4 30 5.79	2.1562	N.17° 19' 26.1"	6.272	23	6 19 16.03	2.3868	N.20° 32' 39.3"	1.444
MONDAY 30.					WEDNESDAY, SEPTEMBER 1.				
0	4 32 15.31	2.1611	N.17° 25' 40.1"	6.192	0	6 21 39.36	2.3909	N.20° 34' 2.3"	1.329
1	4 34 25.13	2.1661	17 31 49.3	6.112	PHASES OF THE MOON.				
2	4 36 35.24	2.1710	17 37 53.6	6.031					
3	4 38 45.65	2.1760	17 43 52.9	5.948					
4	4 40 56.37	2.1810	17 49 47.3	5.864					
5	4 43 7.38	2.1860	17 55 36.6	5.780	● New Moon, . . . 7 <sup>d</sup> 10 <sup>h</sup> 7.9 <sup>m</sup> ☾ First Quarter, . . . 14 0 40.8 ○ Full Moon, . . . 21 16 23.6 ☾ Last Quarter, . . . 29 19 58.3				
6	4 45 18.69	2.1909	18 1 20.9	5.695					
7	4 47 30.30	2.1959	18 7 0.1	5.609					
8	4 49 42.20	2.2009	18 12 34.0	5.522					
9	4 51 54.41	2.2059	18 18 2.7	5.434	☾ Perigee, . . . . . 9 <sup>d</sup> 1.3 <sup>h</sup> ☾ Apogee, . . . . . 24 15.0				
10	4 54 6.91	2.2109	18 23 26.1	5.345					
11	4 56 19.72	2.2159	18 28 44.1	5.256					
12	4 58 32.81	2.2209	18 33 56.8	5.166					
13	5 0 46.22	2.2259	18 39 4.0	5.074					
14	5 2 59.92	2.2309	18 44 5.7	4.981					
15	5 5 13.93	2.2360	18 49 1.8	4.888					
16	5 7 28.24	2.2410	18 53 52.3	4.794					
17	5 9 42.85	2.2462	18 58 37.1	4.698					
18	5 11 57.77	2.2512	19 3 16.1	4.602					
19	5 14 12.98	2.2561	19 7 49.4	4.506					
20	5 16 28.49	2.2611	19 12 16.8	4.408					
21	5 18 44.29	2.2660	19 16 38.3	4.309					
22	5 21 0.39	2.2710	19 20 53.9	4.209					
23	5 23 16.79	2.2759	19 25 3.5	4.109					
24	5 25 33.49	2.2809	N.19° 29' 7.0"	4.008					

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
1	Fomalhaut W.	75 10 24	3135	76 37 51	3119	78 5 38	3102	79 33 45	3086
	α Pegasi W.	60 43 43	3360	62 6 45	3333	63 30 18	3307	64 54 21	3281
	SUN E.	81 6 51	3228	79 41 15	3213	78 15 21	3198	76 49 10	3183
2	Fomalhaut W.	86 59 22	3004	88 29 30	2987	89 59 59	2971	91 30 48	2955
	α Pegasi W.	72 1 55	3163	73 28 49	3140	74 56 10	3118	76 23 58	3096
	α Arietis W.	28 50 57	3491	30 11 31	3409	31 33 37	3336	32 57 7	3269
	SUN E.	69 33 34	3102	68 5 27	3086	66 37 0	3068	65 8 11	3050
3	α Pegasi W.	83 49 26	2994	85 19 46	2974	86 50 31	2955	88 21 40	2938
	α Arietis W.	40 12 9	3010	41 42 9	2989	43 13 0	2931	44 44 40	2894
	Jupiter W.	24 55 36	2725	26 31 43	2701	28 8 21	2678	29 45 30	2655
	SUN E.	57 38 31	2958	56 7 26	2939	54 35 56	2920	53 4 2	2901
4	α Arietis W.	52 34 7	2734	54 10 2	2705	55 46 35	2678	57 23 44	2652
	Jupiter W.	37 58 41	2550	39 38 45	2530	41 19 16	2510	43 0 15	2491
	Aldebaran W.	18 57 22	2492	20 38 47	2473	22 20 38	2455	24 2 55	2437
	SUN E.	45 18 28	2805	43 44 7	2785	42 9 20	2766	40 34 8	2748
5	α Arietis W.	65 37 57	2534	67 18 23	2513	68 59 18	2492	70 40 42	2472
	Jupiter W.	51 31 49	2398	53 15 26	2381	54 59 28	2364	56 43 55	2347
	Aldebaran W.	32 40 39	2350	34 25 26	2333	36 10 38	2316	37 56 14	2300
	SUN E.	32 31 59	2656	30 54 20	2638	29 16 17	2621	27 37 51	2604
9	SUN W.	22 4 30	2345	23 49 24	2346	25 34 16	2348	27 19 6	2350
	Antares E.	89 22 42	2111	87 32 0	2113	85 41 20	2115	83 50 43	2117
	Saturn E.	91 41 44	2059	89 49 41	2061	87 57 41	2062	86 5 44	2065
10	SUN W.	36 2 6	2371	37 46 22	2378	39 30 28	2384	41 14 25	2391
	Antares E.	74 39 1	2141	72 49 5	2149	70 59 20	2156	69 9 46	2163
	Saturn E.	76 47 12	2085	74 55 50	2092	73 4 38	2098	71 13 36	2105
11	SUN W.	49 51 20	2436	51 34 4	2446	53 16 33	2456	54 58 48	2467
	Venus W.	24 33 32	2526	26 14 9	2536	27 54 32	2546	29 34 41	2556
	Antares E.	60 5 28	2217	58 17 26	2229	56 29 42	2243	54 42 18	2256
	Saturn E.	62 1 21	2148	60 11 35	2157	58 22 3	2167	56 32 46	2178
	α Aquilæ E.	106 10 23	2750	104 34 49	2750	102 59 16	2751	101 23 44	2753
12	SUN W.	63 25 59	2527	65 6 34	2540	66 46 51	2553	68 26 51	2566
	Venus W.	37 51 40	2615	39 30 15	2626	41 8 32	2641	42 46 31	2654
	Antares E.	45 50 49	2339	44 5 47	2358	42 21 12	2379	40 37 7	2401
	Saturn E.	47 30 36	2237	45 43 3	2249	43 55 49	2262	42 8 54	2276
	α Aquilæ E.	93 27 33	2788	91 52 50	2799	90 18 21	2811	88 44 7	2825
13	SUN W.	76 42 10	2635	78 20 18	2649	79 58 6	2663	81 35 35	2677
	Venus W.	50 51 55	2723	52 28 4	2737	54 3 55	2751	55 39 27	2766
	Mars W.	22 30 38	2686	24 8 58	2699	25 47 14	2692	27 25 25	2698
	Saturn E.	33 19 21	2346	31 34 28	2362	29 49 58	2377	28 5 50	2394
	α Aquilæ E.	80 57 43	2906	79 25 32	2926	77 53 46	2947	76 22 27	2969
14	SUN W.	89 38 19	2748	91 13 55	2762	92 49 13	2775	94 24 13	2790
	Venus W.	63 32 21	2838	65 6 0	2852	66 39 20	2866	68 12 22	2880
	Mars W.	35 33 56	2682	37 11 0	2692	38 47 50	2703	40 24 26	2714
	Spica W.	30 7 42	2561	31 47 30	2564	33 27 15	2566	35 6 56	2571
	α Aquilæ E.	68 53 11	3098	67 24 59	3127	65 57 22	3158	64 30 23	3192

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Fomalhaut W. α Pegasi W. SUN E.	81° 2' 12" 66 18 55 75 22 41	3089 3256 3168	82° 30' 59" 67 43 58 73 55 53	3052 3232 3153	84° 0' 7" 69 9 29 72 28 47	3036 3209 3136	85° 29' 35" 70 35 28 71 1 21	3081 3185 3119
2	Fomalhaut W. α Pegasi W. α Arietis W. SUN E.	93 1 57 77 52 12 34 21 55 63 39 0	2939 3075 3009 3032	94 33 26 79 20 52 35 47 54 62 9 27	2923 3054 3154 3014	96 5 16 80 49 58 37 14 58 60 39 31	2907 3033 3103 2985	97 37 26 82 19 30 38 43 4 59 9 12	2893 3014 3055 2977
3	α Pegasi W. α Arietis W. Jupiter W. SUN E.	89 53 11 46 17 7 31 23 10 51 31 45	2920 2859 2633 2882	91 25 5 47 50 19 33 1 20 49 59 3	2901 2825 2612 2862	92 57 22 49 24 14 34 39 58 48 25 56	2885 2794 2591 2843	94 30 0 50 58 50 36 19 5 46 52 24	2869 2763 2570 2825
4	α Arietis W. Jupiter W. Aldebaran W. SUN E.	59 1 28 44 41 41 25 45 37 38 58 32	2827 2472 2419 2729	60 39 46 46 23 34 27 28 45 37 22 31	2809 2453 2401 2710	62 18 38 48 5 53 29 12 18 35 46 4	2579 2435 2384 2692	63 58 2 49 48 38 30 56 16 34 9 13	2556 2417 2366 2675
5	α Arietis W. Jupiter W. Aldebaran W. SUN E.	72 22 34 58 28 46 39 42 13 25 59 1	2453 2331 2285 2568	74 4 53 60 14 1 41 28 35 24 19 49	2436 2315 2269 2572	75 47 37 61 59 39 43 15 20 22 40 15	2418 2399 2254 2556	77 30 46 63 45 40 45 2 27 21 0 19	2401 2283 2240 2541
9	SUN W. Antares E. Saturn E.	29 3 52 82 0 10 84 13 51	2353 2190 2068	30 48 34 80 9 42 82 22 2	2357 2125 2072	32 33 11 78 19 21 80 30 19	2361 2130 2075	34 17 42 76 29 7 78 38 42	2366 2135 2080
10	SUN W. Antares E. Saturn E.	42 58 12 67 20 25 69 22 44	2399 2174 2113	44 41 48 65 31 18 67 32 4	2408 2183 2120	46 25 11 63 42 25 65 41 36	2417 2194 2129	48 8 22 61 53 48 63 51 21	2426 2205 2139
11	SUN W. Venus W. Antares E. Saturn E. α Aquilæ E.	56 40 47 31 14 36 52 55 14 54 43 46 99 48 15	2479 2567 2271 2190 2758	58 22 30 32 54 16 51 8 32 52 55 3 98 12 52	2490 2579 2287 2200 2763	60 3 57 34 33 40 49 22 13 51 6 36 96 37 36	2502 2591 2303 2212 2770	61 45 7 36 12 48 47 36 18 49 18 27 95 2 29	2515 2602 2321 2225 2779
12	SUN W. Venus W. Antares E. Saturn E. α Aquilæ E.	70 6 32 44 24 13 38 53 33 40 22 19 87 10 11	2580 2668 2424 2289 2838	71 45 54 46 1 36 37 10 33 38 36 4 85 36 33	2593 2681 2450 2303 2854	73 24 58 47 38 41 35 28 9 36 50 9 84 3 15	2607 2695 2477 2317 2870	75 3 43 49 15 27 33 46 23 35 4 35 82 30 18	2621 2709 2507 2331 2887
13	SUN W. Venus W. Mars W. Saturn E. α Aquilæ E.	83 12 46 57 14 39 29 3 29 26 22 6 74 51 35	2691 2781 2644 2410 2992	84 49 38 58 49 32 30 41 24 24 38 46 73 21 12	2706 2795 2653 2427 3016	86 26 10 60 24 7 32 19 7 22 55 50 71 51 19	2719 2809 2662 2445 3042	88 2 24 61 58 23 33 56 38 21 13 20 70 21 58	2734 2823 2672 2465 3069
14	SUN W. Venus W. Mars W. Spica W. α Aquilæ E.	95 58 54 69 45 6 42 0 47 36 46 31 63 4 4	2804 2894 2725 2576 3226	97 33 17 71 17 32 43 36 53 38 25 59 61 38 26	2818 2903 2738 2582 3264	99 7 21 72 49 40 45 12 43 40 5 19 60 13 32	2831 2923 2749 2588 3303	100 41 8 74 21 30 46 48 18 41 44 30 58 49 24	2845 2936 2760 2596 3344

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
14	Fomalhaut E.	101° 49' 45"	2881	100° 12' 40"	2899	98° 35' 50"	2703	96° 59' 14"	2714
15	SUN W.	102 14 38	2859	103 47 50	2872	105 20 45	2885	106 53 23	2898
	Venus W.	75 53 3	2950	77 24 18	2964	78 55 16	2977	80 25 57	2990
	Mars W.	48 23 38	2772	49 58 42	2785	51 33 30	2798	53 8 3	2808
	Spica W.	43 23 30	2804	45 2 19	2812	46 40 57	2821	48 19 23	2831
	α Aquilæ E.	57 26 3	3387	56 3 32	3435	54 41 55	3485	53 21 14	3537
	Fomalhaut E.	89 0 5	2775	87 25 4	2788	85 50 20	2801	84 15 54	2815
	α Pegasi E.	104 6 34	2917	102 34 37	2925	101 2 50	2933	99 31 13	2941
16	Venus W.	87 55 18	3055	89 24 23	3068	90 53 12	3080	92 21 46	3092
	Mars W.	60 56 58	2888	62 30 0	2877	64 2 48	2889	65 35 21	2900
	Spica W.	56 28 25	2878	58 5 35	2887	59 42 33	2898	61 19 18	2707
	Fomalhaut E.	76 28 10	2886	74 55 33	2901	73 23 16	2917	71 51 19	2933
	α Pegasi E.	91 55 58	2990	90 25 33	3001	88 55 22	3012	87 25 25	3025
17	Mars W.	73 14 37	2954	74 45 47	2964	76 16 45	2974	77 47 30	2985
	Spica W.	69 19 50	2753	70 55 19	2763	72 30 36	2772	74 5 41	2781
	Saturn W.	20 41 8	2758	22 16 31	2764	23 51 46	2769	25 26 54	2775
	Fomalhaut E.	64 16 44	3019	62 46 55	3039	61 17 30	3058	59 48 29	3078
	α Pegasi E.	79 59 31	3090	78 31 9	3104	77 3 4	3119	75 35 17	3134
18	Mars W.	85 18 8	3033	86 47 40	3043	88 16 59	3052	89 46 7	3060
	Spica W.	81 58 9	2825	83 32 4	2834	85 5 48	2842	86 39 21	2851
	Antares W.	36 32 42	2944	38 4 5	2942	39 35 30	2942	41 6 56	2942
	Saturn W.	33 20 24	2811	34 54 37	2818	36 28 41	2826	38 2 35	2833
	Fomalhaut E.	52 29 55	3195	51 3 40	3221	49 37 56	3250	48 12 46	3282
	α Pegasi E.	68 21 12	3219	66 55 25	3238	65 30 1	3258	64 5 0	3278
19	Mars W.	97 9 6	3105	98 37 10	3113	100 5 4	3121	101 32 48	3130
	Spica W.	94 24 26	2891	95 56 56	2899	97 29 16	2907	99 1 26	2916
	Antares W.	48 43 39	2954	50 14 50	2958	51 45 56	2961	53 16 58	2965
	Saturn W.	45 49 40	2871	47 22 36	2879	48 55 22	2886	50 27 59	2893
	Fomalhaut E.	41 16 53	3474	39 56 0	3594	38 36 2	3577	37 17 3	3637
	α Pegasi E.	57 6 18	3398	55 43 59	3426	54 22 12	3455	53 0 58	3488
	α Arietis E.	99 7 18	3016	97 37 25	3023	96 7 41	3030	94 38 5	3036
20	Antares W.	60 50 47	2987	62 21 16	2993	63 51 38	2997	65 21 54	3002
	Saturn W.	58 8 51	2927	59 40 35	2934	61 12 11	2940	62 43 39	2947
	α Pegasi E.	46 24 27	3683	45 7 22	3733	43 51 10	3786	42 35 53	3844
	α Arietis E.	87 12 13	3073	85 43 30	3079	84 14 55	3087	82 46 29	3095
	Jupiter E.	101 38 22	2950	100 7 6	2957	98 35 59	2963	97 5 0	2969
21	Antares W.	72 51 43	3027	74 21 22	3032	75 50 55	3037	77 20 22	3043
	Saturn W.	70 18 56	2977	71 49 37	2984	73 20 10	2989	74 50 36	2995
	α Arietis E.	75 26 42	3134	73 59 14	3143	72 31 56	3152	71 4 49	3160
	Jupiter E.	89 32 3	3000	88 1 50	3005	86 31 44	3011	85 1 45	3018
	Aldebaran E.	106 55 5	2968	105 24 12	2974	103 53 27	2980	102 22 49	2985
22	Antares W.	84 46 4	3066	86 14 55	3071	87 43 40	3075	89 12 20	3080
	Saturn W.	82 21 4	3029	83 50 50	3026	85 20 30	3031	86 50 4	3036
	α Aquilæ W.	44 34 46	4318	45 41 22	4259	46 48 53	4203	47 57 16	4153
	α Arietis E.	63 51 55	3207	62 25 54	3218	61 0 6	3229	59 34 31	3239
	Jupiter E.	77 33 34	3043	76 4 14	3048	74 35 1	3053	73 5 54	3057
	Aldebaran E.	94 51 22	3012	93 21 24	3017	91 51 32	3022	90 21 46	3026



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
14	Fomalhaut	E.	95° 22' 53"	2725	93° 46' 47"	2738	92° 10' 57"	2750	90° 35' 23"	2762
15	Sun	W.	108 25 44	2911	109 57 49	2924	111 29 37	2937	113 1 9	2949
	Venus	W.	81 56 22	3004	83 26 30	3017	84 56 22	3030	86 25 58	3043
	Mars	W.	54 42 20	2920	56 16 22	2931	57 50 9	2943	59 23 41	2955
	Spica	W.	49 57 36	2840	51 35 37	2849	53 13 26	2858	54 51 2	2868
	α Aquilæ	E.	52 1 31	3595	50 42 51	3656	49 25 17	3722	48 8 53	3792
	Fomalhaut	E.	82 41 45	2828	81 7 54	2842	79 34 21	2856	78 1 6	2871
	α Pegasi	E.	97 59 46	2950	96 28 30	2960	94 57 27	2969	93 26 36	2980
16	Venus	W.	93 50 5	3104	95 18 10	3116	96 46 0	3128	98 13 36	3138
	Mars	W.	67 7 40	2911	68 39 45	2922	70 11 36	2933	71 43 13	2943
	Spica	W.	62 55 49	2716	64 32 8	2725	66 8 14	2735	67 44 8	2744
	Fomalhaut	E.	70 19 42	2950	68 48 26	2965	67 17 30	2983	65 46 56	3001
	α Pegasi	E.	85 55 43	3037	84 26 16	3050	82 57 5	3063	81 28 10	3076
17	Mars	W.	79 18 2	2994	80 48 22	3005	82 18 29	3014	83 48 24	3023
	Spica	W.	75 40 34	2790	77 15 15	2798	78 49 45	2808	80 24 3	2817
	Saturn	W.	27 1 54	2782	28 36 45	2788	30 11 28	2796	31 46 1	2804
	Fomalhaut	E.	58 19 52	3099	56 51 41	3121	55 23 57	3144	53 56 41	3169
	α Pegasi	E.	74 7 49	3150	72 40 40	3166	71 13 50	3183	69 47 20	3201
18	Mars	W.	91 15 5	3069	92 43 52	3079	94 12 27	3087	95 40 52	3096
	Spica	W.	88 12 43	2859	89 45 54	2867	91 18 55	2875	92 51 46	2883
	Antares	W.	42 38 21	2943	44 9 45	2946	45 41 6	2948	47 12 24	2950
	Saturn	W.	39 36 20	2841	41 9 55	2848	42 43 20	2856	44 16 35	2864
	Fomalhaut	E.	46 48 14	3315	45 24 20	3350	44 1 6	3388	42 38 36	3430
	α Pegasi	E.	62 40 23	3300	61 16 11	3323	59 52 26	3346	58 29 8	3371
19	Mars	W.	103 0 21	3138	104 27 45	3146	105 54 59	3153	107 22 4	3162
	Spica	W.	100 33 25	2923	102 5 15	2931	103 36 55	2939	105 8 25	2946
	Antares	W.	54 47 55	2969	56 18 46	2973	57 49 32	2978	59 20 12	2982
	Saturn	W.	52 0 27	2900	53 32 46	2907	55 4 56	2913	56 36 58	2920
	Fomalhaut	E.	35 59 9	3703	34 42 25	3777	33 26 59	3859	32 12 58	3952
	α Pegasi	E.	51 40 20	3521	50 20 19	3557	49 0 58	3597	47 42 20	3638
	α Arietis	E.	93 8 37	3043	91 39 18	3050	90 10 7	3057	88 41 5	3065
20	Antares	W.	66 52 4	3007	68 22 8	3012	69 52 6	3017	71 21 58	3022
	Saturn	W.	64 14 58	2954	65 46 9	2960	67 17 12	2965	68 48 8	2972
	α Pegasi	E.	41 21 36	3908	40 8 24	3976	38 56 21	4052	37 45 33	4138
	α Arietis	E.	81 18 13	3102	79 50 6	3110	78 22 8	3118	76 54 20	3126
	Jupiter	E.	95 34 9	2976	94 3 26	2982	92 32 51	2988	91 2 23	2994
21	Antares	W.	78 49 42	3047	80 18 56	3052	81 48 5	3054	83 17 8	3062
	Saturn	W.	76 20 55	3001	77 51 7	3005	79 21 13	3011	80 51 12	3017
	α Arietis	E.	69 37 52	3169	68 11 6	3178	66 44 31	3186	65 18 7	3196
	Jupiter	E.	83 31 54	3023	82 2 9	3028	80 32 31	3034	79 3 0	3038
	Aldebaran	E.	100 52 18	2991	99 21 54	2997	97 51 37	3001	96 21 26	3007
22	Antares	W.	90 40 54	3084	92 9 23	3089	93 37 46	3093	95 6 4	3097
	Saturn	W.	88 19 32	3040	89 48 55	3045	91 18 12	3049	92 47 24	3052
	α Aquilæ	W.	49 6 27	4107	50 16 22	4065	51 26 58	4026	52 38 12	3991
	α Arietis	E.	58 9 8	3251	56 43 59	3263	55 19 4	3276	53 54 24	3288
	Jupiter	E.	71 36 52	3082	70 7 56	3066	68 39 5	3071	67 10 20	3074
	Aldebaran	E.	88 52 5	3030	87 22 30	3034	85 53 0	3039	84 23 36	3043

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
23	Antares W.	96 34 17	3101	98 2 25	3105	99 30 28	3110	100 58 26	3113
	Saturn W.	94 16 32	3056	95 45 35	3060	97 14 33	3065	98 43 26	3067
	α Aquilæ W.	53 50 0	3900	55 2 19	3930	56 15 8	3904	57 28 24	3880
	α Arietis E.	52 29 58	3301	51 5 48	3317	49 41 56	3332	48 18 22	3348
	Jupiter E.	65 41 39	3078	64 13 3	3082	62 44 32	3086	61 16 5	3089
	Aldebaran E.	82 54 16	3047	81 25 1	3050	79 55 50	3054	78 26 44	3056
24	α Aquilæ W.	63 40 21	3784	64 55 40	3768	66 11 16	3753	67 27 7	3741
	Fomalhaut W.	29 27 17	4248	30 34 58	4150	31 44 12	4064	32 54 49	3988
	α Arietis E.	41 25 38	3450	40 4 18	3477	38 43 28	3506	37 23 10	3537
	Jupiter E.	53 54 49	3104	52 26 44	3107	50 58 43	3109	49 30 44	3110
	Aldebaran E.	71 2 5	3069	69 33 18	3072	68 4 34	3073	66 35 52	3075
25	α Aquilæ W.	73 49 27	3688	75 6 27	3679	76 23 36	3672	77 40 53	3663
	Fomalhaut W.	39 4 6	3792	40 20 30	3683	41 37 35	3649	42 55 17	3616
	Jupiter E.	42 11 21	3119	40 43 34	3119	39 15 48	3120	37 48 3	3121
	Aldebaran E.	59 12 42	3078	57 44 6	3078	56 15 30	3078	54 46 53	3077
	Pollux E.	103 19 1	3123	101 51 19	3123	100 23 37	3121	98 55 53	3120
26	α Aquilæ W.	84 9 10	3634	85 27 8	3628	86 45 12	3623	88 3 21	3620
	Fomalhaut W.	49 31 34	3491	50 52 8	3471	52 13 5	3452	53 34 23	3434
	α Pegasi W.	37 18 59	4195	38 27 30	4190	39 37 12	4052	40 48 0	3991
	Jupiter E.	30 29 31	3125	29 1 52	3125	27 34 13	3127	26 6 36	3129
	Aldebaran E.	47 23 27	3069	45 54 39	3066	44 25 48	3063	42 56 53	3059
	Pollux E.	91 36 49	3110	90 8 52	3108	88 40 52	3105	87 12 48	3102
27	α Aquilæ W.	94 35 11	3601	95 53 44	3598	97 12 20	3597	98 30 58	3595
	Fomalhaut W.	60 25 43	3353	61 48 53	3338	63 12 20	3325	64 36 3	3311
	α Pegasi W.	46 55 47	3750	48 11 41	3711	49 28 16	3676	50 45 29	3641
	Aldebaran E.	35 31 4	3037	34 1 37	3031	32 32 3	3026	31 2 22	3018
	Pollux E.	79 51 21	3080	78 22 47	3074	76 54 6	3069	75 25 18	3064
	SUN E.	121 45 48	3405	120 23 37	3399	119 1 19	3392	117 38 53	3385
28	Fomalhaut W.	71 38 36	3943	73 3 54	3930	74 29 28	3917	75 55 17	3904
	α Pegasi W.	57 20 8	3497	58 40 36	3471	60 1 33	3446	61 22 57	3423
	Pollux E.	67 59 24	3029	66 29 47	3021	65 0 0	3013	63 30 2	3005
	SUN E.	110 44 33	3343	109 21 11	3332	107 57 37	3323	106 33 52	3312
29	Fomalhaut W.	83 8 21	3137	84 35 46	3123	86 3 28	3110	87 31 26	3096
	α Pegasi W.	68 16 28	3313	69 40 25	3293	71 4 45	3272	72 29 29	3252
	α Arietis W.	25 27 25	3846	26 41 40	3738	27 57 47	3642	29 15 36	3557
	Pollux E.	55 57 35	2958	54 26 30	2949	52 55 13	2939	51 23 44	2929
	SUN E.	99 31 50	3252	98 6 42	3239	96 41 19	3225	95 15 40	3211
30	α Pegasi W.	79 38 56	3157	81 5 57	3138	82 33 21	3119	84 1 7	3101
	α Arietis W.	36 5 8	3946	37 30 23	3198	38 56 34	3154	40 23 38	3113
	Jupiter W.	18 28 45	2887	20 1 20	2861	21 34 29	2835	23 8 11	2811
	Pollux E.	43 43 6	2880	42 10 21	2869	40 37 23	2861	39 4 14	2853
	SUN E.	88 3 3	3134	86 35 35	3119	85 7 48	3101	83 39 40	3064
31	α Pegasi W.	91 25 21	3014	92 55 16	2998	94 25 31	2982	95 56 6	2968
	α Arietis W.	47 50 42	2936	49 22 15	2905	50 54 27	2875	52 27 18	2846
	Jupiter W.	31 4 22	2699	32 41 3	2679	34 18 11	2658	35 55 47	2638
	Pollux E.	31 16 13	2827	29 42 20	2828	28 8 29	2832	26 34 43	2841
	SUN E.	76 13 38	2994	74 43 18	2975	73 12 34	2957	71 41 27	2937

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
23	Antares	W.	102° 26' 20"	3116	103° 54' 10"	3120	105° 21' 55"	3124	106° 49' 36"	3127
	Saturn	W.	100 12 16	3070	101 41 2	3073	103 9 44	3076	104 38 23	3078
	α Aquilæ	W.	58 42 4	3857	59 56 7	3835	61 10 33	3817	62 25 18	3799
	α Arietis	E.	46 55 6	3365	45 32 10	3385	44 9 36	3405	42 47 25	3496
	Jupiter	E.	59 47 42	3092	58 19 23	3096	56 51 8	3099	55 22 57	3101
	Aldebaran	E.	76 57 41	3060	75 28 42	3063	73 59 47	3065	72 30 55	3067
24	α Aquilæ	W.	68 43 11	3798	69 59 28	3717	71 15 57	3707	72 32 37	3697
	Fomalhaut	W.	34 6 40	3921	35 19 38	3963	36 33 35	3811	37 48 26	3764
	α Arietis	E.	36 3 27	3573	34 44 23	3611	33 26 1	3655	32 8 26	3706
	Jupiter	E.	48 2 47	3112	46 34 52	3114	45 7 0	3116	43 39 10	3117
	Aldebaran	E.	65 7 12	3076	63 38 33	3077	62 9 55	3076	60 41 18	3078
25	α Aquilæ	W.	78 58 19	3657	80 15 52	3651	81 33 31	3645	82 51 17	3638
	Fomalhaut	W.	44 13 34	3587	45 32 22	3561	46 51 39	3535	48 11 24	3513
	Jupiter	E.	36 20 19	3122	34 52 36	3122	33 24 53	3123	31 57 11	3124
	Aldebaran	E.	53 18 15	3076	51 49 36	3074	50 20 55	3073	48 52 12	3071
	Pollux	E.	97 28 8	3119	96 0 21	3118	94 32 33	3115	93 4 42	3114
26	α Aquilæ	W.	89 21 34	3615	90 39 52	3610	91 58 15	3608	93 16 41	3604
	Fomalhaut	W.	54 56 1	3416	56 17 59	3400	57 40 15	3364	59 2 50	3368
	α Pegasi	W.	41 59 48	3935	43 12 32	3882	44 26 10	3835	45 40 36	3792
	Jupiter	E.	24 39 1	3131	23 11 29	3135	21 44 2	3140	20 16 41	3146
	Aldebaran	E.	41 27 53	3056	39 58 49	3051	38 29 39	3047	37 0 24	3043
	Pollux	E.	85 44 41	3098	84 16 29	3094	82 48 12	3089	81 19 49	3085
27	α Aquilæ	W.	99 49 38	3593	101 8 20	3591	102 27 4	3590	103 45 49	3590
	Fomalhaut	W.	66 0 2	3297	67 24 17	3284	68 48 47	3270	70 13 33	3256
	α Pegasi	W.	52 3 19	3610	53 21 43	3579	54 40 40	3550	56 0 9	3523
	Aldebaran	E.	29 32 32	3012	28 2 34	3005	26 32 28	2998	25 2 13	2990
	Pollux	E.	73 56 24	3057	72 27 22	3050	70 58 11	3043	69 28 52	3036
	Sun	E.	116 16 19	3377	114 53 36	3370	113 30 45	3361	112 7 44	3352
28	Fomalhaut	W.	77 21 22	3191	78 47 42	3177	80 14 19	3163	81 41 12	3150
	α Pegasi	W.	62 44 48	3400	64 7 5	3377	65 29 48	3355	66 52 56	3334
	Pollux	E.	61 59 56	2996	60 29 38	2986	58 59 8	2977	57 28 27	2969
	Sun	E.	105 9 54	3301	103 45 44	3289	102 21 20	3277	100 56 42	3265
29	Fomalhaut	W.	88 59 40	3082	90 28 11	3068	91 57 0	3055	93 26 5	3041
	α Pegasi	W.	73 54 37	3232	75 20 8	3214	76 46 1	3194	78 12 17	3175
	α Arietis	W.	30 34 57	3482	31 55 41	3414	33 17 42	3352	34 40 53	3297
	Pollux	E.	49 52 2	2919	48 20 7	2909	46 47 59	2899	45 15 39	2889
	Sun	E.	93 49 44	3197	92 23 31	3182	90 57 0	3167	89 30 11	3151
30	α Pegasi	W.	85 29 15	3064	86 57 44	3066	88 26 35	3049	89 55 47	3031
	α Arietis	W.	41 51 32	3073	43 20 14	3038	44 49 40	3002	46 19 50	2960
	Jupiter	W.	24 42 25	2787	26 17 10	2764	27 52 25	2742	29 28 9	2720
	Pollux	E.	37 30 55	2845	35 57 26	2838	34 23 48	2833	32 50 3	2829
	Sun	E.	82 11 11	3067	80 42 21	3049	79 13 9	3031	77 43 35	3013
31	α Pegasi	W.	97 27 1	2951	98 58 15	2935	100 29 49	2921	102 1 41	2907
	α Arietis	W.	54 0 46	2818	55 34 51	2790	57 9 32	2763	58 44 48	2738
	Jupiter	W.	37 33 50	2618	39 12 21	2597	40 51 20	2577	42 30 47	2557
	Pollux	E.	25 1 8	2855	23 27 51	2876	21 55 1	2905	20 22 48	2942
	Sun	E.	70 9 55	2917	68 37 58	2898	67 5 37	2879	65 32 51	2859

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be subtracted from Apparent Time.	Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.			
Wed.	1	<sup>h</sup> 10 <sup>m</sup> 42 <sup>s</sup> 31.94	9.072	N. <sup>c</sup> 8 <sup>'</sup> 11 <sup>"</sup> 15.0	54.57	15' 53".79	<sup>s</sup> 64.40	<sup>m</sup> 0 <sup>s</sup> 12.74	<sup>s</sup> 0.784
Thur.	2	10 46 9.50	9.061	7 49 21.6	54.90	15 54.02	64.36	0 31.68	0.795
Frid.	3	10 49 46.81	9.051	7 27 20.5	55.21	15 54.25	64.32	0 50.87	0.805
Sat.	4	10 53 23.88	9.041	7 5 12.2	55.51	15 54.49	64.28	1 10.30	0.815
Sun.	5	10 57 0.72	9.032	6 42 56.8	55.80	15 54.73	64.25	1 29.97	0.824
Mon.	6	11 0 37.32	9.023	6 20 34.7	56.07	15 54.97	64.22	1 49.86	0.833
Tues.	7	11 4 13.72	9.015	5 58 6.3	56.32	15 55.22	64.19	2 9.96	0.841
Wed.	8	11 7 49.94	9.007	5 35 31.9	56.56	15 55.47	64.16	2 30.24	0.849
Thur.	9	11 11 25.98	9.000	5 12 52.0	56.79	15 55.72	64.14	2 50.70	0.856
Frid.	10	11 15 1.86	8.994	4 50 6.9	57.00	15 55.98	64.12	3 11.32	0.862
Sat.	11	11 18 37.60	8.988	4 27 16.7	57.20	15 56.24	64.11	3 32.07	0.868
Sun.	12	11 22 13.22	8.983	4 4 21.8	57.38	15 56.50	64.09	3 52.94	0.873
Mon.	13	11 25 48.73	8.979	3 41 22.8	57.55	15 56.76	64.08	4 13.93	0.877
Tues.	14	11 29 24.14	8.976	3 18 19.9	57.71	15 57.02	64.07	4 35.02	0.880
Wed.	15	11 32 59.49	8.973	2 55 13.4	57.85	15 57.29	64.06	4 56.16	0.883
Thur.	16	11 36 34.79	8.972	2 32 3.8	57.98	15 57.56	64.06	5 17.35	0.884
Frid.	17	11 40 10.05	8.971	2 8 51.1	58.10	15 57.83	64.06	5 38.58	0.885
Sat.	18	11 43 45.32	8.972	1 45 35.7	58.20	15 58.10	64.06	5 59.81	0.884
Sun.	19	11 47 20.62	8.973	1 22 18.3	58.29	15 58.36	64.07	6 21.01	0.883
Mon.	20	11 50 55.97	8.976	0 58 58.9	58.36	15 58.63	64.08	6 42.15	0.880
Tues.	21	11 54 31.39	8.979	0 35 37.8	58.42	15 58.90	64.09	7 3.22	0.877
Wed.	22	11 58 6.89	8.984	N. 0 12 15.6	58.47	15 59.17	64.10	7 24.22	0.872
Thur.	23	12 1 42.51	8.989	S. 0 11 7.7	58.50	15 59.44	64.12	7 45.10	0.867
Frid.	24	12 5 18.28	8.996	0 34 31.8	58.52	15 59.71	64.14	8 5.82	0.860
Sat.	25	12 8 54.21	9.003	0 57 56.2	58.53	15 59.98	64.17	8 26.38	0.853
Sun.	26	12 12 30.32	9.012	1 21 20.4	58.52	16 0.25	64.19	8 46.77	0.844
Mon.	27	12 16 6.65	9.021	1 44 44.3	58.50	16 0.52	64.22	9 6.94	0.835
Tues.	28	12 19 43.21	9.031	2 8 7.6	58.47	16 0.79	64.25	9 26.88	0.825
Wed.	29	12 23 20.03	9.041	2 31 29.9	58.42	16 1.06	64.29	9 46.56	0.815
Thur.	30	12 26 57.11	9.053	2 54 50.9	58.36	16 1.33	64.33	10 5.97	0.803
Frid.	31	12 30 34.49	9.065	S. 3 18 10.1	58.28	16 1.60	64.37	10 25.10	0.791

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0a.18 from the Sidereal Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be added to Mean Time.	Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.			
Wed.	1	<sup>h</sup> 10 <sup>m</sup> 42 <sup>s</sup> 31.97	9.072	N. 8° 11' 14.9"	54.57	<sup>m</sup> 0 <sup>s</sup> 12.75	0.784	<sup>h</sup> 10 <sup>m</sup> 42 <sup>s</sup> 44.72
Thur.	2	10 46 9.58	9.061	7 49 21.1	54.90	0 31.70	0.795	10 46 41.28
Frid.	3	10 49 46.94	9.051	7 27 19.7	55.21	0 50.89	0.805	10 50 37.83
Sat.	4	10 53 24.06	9.041	7 5 11.1	55.51	1 10.32	0.815	10 54 34.38
Sun.	5	10 57 0.95	9.032	6 42 55.4	55.80	1 29.98	0.824	10 58 30.93
Mon.	6	11 0 37.60	9.023	6 20 33.0	56.07	1 49.89	0.833	11 2 27.49
Tues.	7	11 4 14.05	9.015	5 58 4.3	56.32	2 9.99	0.841	11 6 24.04
Wed.	8	11 7 50.32	9.007	5 35 29.6	56.56	2 30.27	0.849	11 10 20.59
Thur.	9	11 11 26.41	9.000	5 12 49.3	56.79	2 50.74	0.856	11 14 17.15
Frid.	10	11 15 2.34	8.994	4 50 3.8	57.00	3 11.36	0.862	11 18 13.70
Sat.	11	11 18 38.13	8.988	4 27 13.3	57.20	3 32.12	0.868	11 22 10.25
Sun.	12	11 22 13.80	8.983	4 4 18.0	57.38	3 53.00	0.873	11 26 6.80
Mon.	13	11 25 49.36	8.979	3 41 18.7	57.55	4 13.99	0.877	11 30 3.35
Tues.	14	11 29 24.83	8.976	3 18 15.5	57.71	4 35.08	0.880	11 33 59.91
Wed.	15	11 33 0.23	8.973	2 55 8.7	57.85	4 56.23	0.883	11 37 56.46
Thur.	16	11 36 35.58	8.972	2 31 58.7	57.98	5 17.43	0.884	11 41 53.01
Frid.	17	11 40 10.90	8.971	2 8 45.6	58.10	5 38.66	0.885	11 45 49.56
Sat.	18	11 43 46.22	8.972	1 45 29.9	58.20	5 59.90	0.884	11 49 46.12
Sun.	19	11 47 21.57	8.973	1 22 12.1	58.29	6 21.10	0.883	11 53 42.67
Mon.	20	11 50 56.97	8.976	0 58 52.4	58.36	6 42.25	0.880	11 57 39.22
Tues.	21	11 54 32.45	8.979	0 35 31.0	58.42	7 3.32	0.877	12 1 35.77
Wed.	22	11 58 8.00	8.984	N. 0 12 8.3	58.47	7 24.32	0.872	12 5 32.32
Thur.	23	12 1 43.67	8.989	S. 0 11 15.3	58.50	7 45.21	0.867	12 9 28.88
Frid.	24	12 5 19.49	8.996	0 34 39.6	58.52	8 5.94	0.860	12 13 25.43
Sat.	25	12 8 55.48	9.003	0 58 4.3	58.53	8 26.50	0.853	12 17 21.98
Sun.	26	12 12 31.64	9.012	1 21 28.9	58.52	8 46.89	0.844	12 21 18.53
Mon.	27	12 16 8.02	9.021	1 44 53.2	58.50	9 7.07	0.835	12 25 15.09
Tues.	28	12 19 44.63	9.031	2 8 16.8	58.47	9 27.01	0.825	12 29 11.64
Wed.	29	12 23 21.50	9.041	2 31 39.5	58.42	9 46.69	0.815	12 33 8.19
Thur.	30	12 26 58.64	9.053	2 55 0.8	58.36	10 6.10	0.803	12 37 4.74
Frid.	31	12 30 36.06	9.065	S. 3 18 20.3	58.28	10 25.24	0.791	12 41 1.30

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+ 9".8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S				Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Ob.	
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	244	159° 2' 26.0	2' 5.8	145.34	—0.13	0.0037229	43.0	13 15 4.66	
2	245	160 0 35.2	0 14.9	145.42	—0.01	.0036187	43.7	13 11 8.75	
3	246	160 58 46.3	58 25.9	145.50	+0.11	.0035129	44.4	13 7 12.85	
4	247	161 56 59.3	56 38.8	145.58	0.24	.0034055	45.1	13 3 16.94	
5	248	162 55 14.2	54 53.6	145.66	0.36	.0032965	45.7	12 59 21.04	
6	249	163 53 31.0	53 10.3	145.74	0.47	.0031860	46.4	12 55 25.13	
7	250	164 51 49.6	51 28.8	145.81	0.56	.0030740	47.0	12 51 29.22	
8	251	165 50 9.8	49 49.0	145.88	0.62	.0029604	47.6	12 47 33.32	
9	252	166 48 31.7	48 10.9	145.95	0.65	.0028453	48.2	12 43 37.41	
10	253	167 46 55.4	46 34.4	146.02	0.65	.0027289	48.7	12 39 41.50	
11	254	168 45 20.7	44 59.5	146.08	0.62	.0026113	49.2	12 35 45.60	
12	255	169 43 47.5	43 26.3	146.15	0.56	.0024926	49.6	12 31 49.69	
13	256	170 42 16.0	41 54.7	146.22	0.47	.0023729	50.0	12 27 53.79	
14	257	171 40 46.1	40 24.7	146.29	0.35	.0022525	50.3	12 23 57.89	
15	258	172 39 17.9	38 56.4	146.36	0.22	.0021315	50.5	12 20 1.98	
16	259	173 37 51.3	37 29.7	146.43	+0.09	.0020100	50.7	12 16 6.07	
17	260	174 36 26.3	36 4.7	146.49	—0.04	.0018882	50.8	12 12 10.16	
18	261	175 35 3.1	34 41.4	146.56	0.17	.0017662	50.8	12 8 14.25	
19	262	176 33 41.7	33 19.9	146.64	0.29	.0016442	50.8	12 4 18.35	
20	263	177 32 22.1	32 0.2	146.72	0.39	.0015222	50.8	12 0 22.44	
21	264	178 31 4.5	30 42.5	146.81	0.47	.0014002	50.8	11 56 26.54	
22	265	179 29 49.0	29 26.9	146.89	0.52	.0012784	50.8	11 52 30.64	
23	266	180 28 35.6	28 13.4	146.98	0.53	.0011566	50.7	11 48 34.73	
24	267	181 27 24.2	27 1.9	147.07	0.52	.0010350	50.7	11 44 38.82	
25	268	182 26 15.0	25 52.6	147.16	0.48	.0009135	50.6	11 40 42.92	
26	269	183 25 8.2	24 45.7	147.25	0.41	.0007920	50.6	11 36 47.01	
27	270	184 24 3.6	23 41.1	147.35	0.31	.0006704	50.7	11 32 51.10	
28	271	185 23 1.2	22 38.6	147.44	0.19	.0005488	50.8	11 28 55.20	
29	272	186 22 1.1	21 38.4	147.54	—0.06	.0004269	50.9	11 24 59.29	
30	273	187 21 3.4	20 40.6	147.64	+0.07	.0003046	51.0	11 21 3.38	
31	274	188 20 8.0	19 45.1	147.74	+0.20	0.0001818	51.2	11 17 7.48	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>s</sup> .830	

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.

## SEMI-DIAMETER.

## HORIZONTAL PARALLAX

## MERIDIAN PASSAGE.

AGE.

Noon.

Midnight.

Noon.

Diff. for  
1 hour.

Midnight.

Diff. for  
1 hour.Diff. for  
1 hour.

d

Day of the Month.	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.			AGE.
1	15' 46.1	15' 53.9	57' 45.5	+2.38	58' 14.3	+2.41	<sup>h</sup> 20 <sup>m</sup> 25.1	<sup>m</sup> 2.39	<sup>d</sup> 24.6
2	16 1.8	16 9.5	58 43.1	2.39	59 11.4	2.32	21 23.2	2.43	25.6
3	16 16.8	16 23.7	59 38.5	2.19	60 3.6	1.99	22 21.9	2.44	26.6
4	16 29.8	16 34.9	60 26.0	1.73	60 45.0	1.43	23 20.1	2.40	27.6
5	16 39.0	16 41.9	61 0.1	1.08	61 10.8	+0.69	<sup>h</sup> 0 <sup>m</sup> 17.0		28.6
6	16 43.6	16 43.9	61 16.7	+0.29	61 17.7	-0.12	0 17.0	2.34	0.3
7	16 42.8	16 40.4	61 13.8	-0.52	61 5.2	0.90	1 12.6	2.29	1.3
8	16 36.9	16 32.3	60 52.3	1.25	60 35.5	1.55	2 7.1	2.26	2.3
9	16 26.9	16 20.7	60 15.4	1.79	59 52.7	1.98	3 1.1	2.25	3.3
10	16 14.0	16 6.9	59 28.1	2.11	59 2.3	2.19	3 54.9	2.24	4.3
11	15 59.7	15 52.5	58 35.7	2.22	58 9.2	2.20	4 48.7	2.24	5.3
12	15 45.4	15 38.5	57 43.1	2.15	57 17.8	2.06	5 42.5	2.23	6.3
13	15 31.9	15 25.7	56 53.6	1.96	56 30.8	1.84	6 36.0	2.21	7.3
14	15 19.9	15 14.6	56 9.5	1.71	55 49.8	1.57	7 28.5	2.15	8.3
15	15 9.7	15 5.2	55 31.8	1.43	55 15.5	1.29	8 19.4	2.08	9.3
16	15 1.2	14 57.7	55 0.8	1.15	54 47.8	1.02	9 8.3	1.99	10.3
17	14 54.6	14 51.9	54 36.4	0.89	54 26.5	0.76	9 55.1	1.91	11.3
18	14 49.6	14 47.8	54 18.2	0.63	54 11.3	0.51	10 40.0	1.83	12.3
19	14 46.3	14 45.1	54 5.9	0.40	54 1.7	0.29	11 23.2	1.78	13.3
20	14 44.4	14 44.0	53 58.9	-0.18	53 57.3	-0.08	12 5.3	1.74	14.3
21	14 43.9	14 44.2	53 57.1	+0.03	53 58.2	+0.15	12 46.8	1.73	15.3
22	14 44.8	14 45.9	54 0.7	0.26	54 4.6	0.39	13 28.5	1.75	16.3
23	14 47.4	14 49.3	54 9.9	0.51	54 16.9	0.65	14 10.9	1.80	17.3
24	14 51.6	14 54.4	54 25.5	0.79	54 35.9	0.94	14 54.8	1.87	18.3
25	14 57.8	15 1.6	54 48.1	1.09	55 2.1	1.25	15 40.7	1.96	19.3
26	15 5.9	15 10.8	55 18.1	1.41	55 36.0	1.57	16 29.1	2.07	20.3
27	15 16.2	15 22.1	55 55.7	1.72	56 17.3	1.87	17 20.1	2.18	21.3
28	15 28.4	15 35.2	56 40.6	2.01	57 5.4	2.13	18 13.6	2.27	22.3
29	15 42.3	15 49.7	57 31.6	2.23	57 58.8	2.29	19 9.1	2.33	23.3
30	15 57.2	16 4.8	58 26.5	2.32	58 54.3	2.31	20 5.7	2.36	24.3
31	16 12.3	16 19.4	59 21.6	+2.24	59 47.8	+2.12	21 2.5	2.36	25.3

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 1.					FRIDAY 3.				
0	h m s	s	N. 20° 34' 23"	1.322	0	h m s	s	N. 19° 8' 17.3"	5.008
1	6 21 39.36	2.3909	20 35 18.0	1.900	1	8 20 0.20	2.5122	19 3 12.8	5.142
2	6 24 2.93	2.3949	20 36 26.3	1.078	2	8 22 30.95	2.5128	18 58 0.2	5.276
3	6 26 26.75	2.3990	20 37 27.3	0.956	3	8 25 1.74	2.5134	18 52 39.6	5.410
4	6 28 50.81	2.4030	20 38 21.0	0.833	4	8 27 32.56	2.5139	18 47 11.0	5.544
5	6 31 15.11	2.4070	20 39 7.3	0.708	5	8 30 3.41	2.5143	18 41 34.4	5.677
6	6 33 39.65	2.4109	20 39 46.0	0.583	6	8 32 34.28	2.5147	18 35 49.8	5.810
7	6 36 4.42	2.4147	20 40 17.3	0.458	7	8 35 5.17	2.5150	18 29 57.3	5.942
8	6 38 29.42	2.4185	20 40 41.0	0.332	8	8 37 36.07	2.5152	18 23 56.8	6.074
9	6 40 54.64	2.4222	20 40 57.1	0.205	9	8 40 6.99	2.5153	18 17 48.4	6.205
10	6 43 20.08	2.4259	20 41 5.6	0.078	10	8 42 37.91	2.5153	18 11 32.2	6.336
11	6 45 45.75	2.4295	20 41 6.4	0.050	11	8 45 8.83	2.5153	18 5 8.1	6.467
12	6 48 11.63	2.4330	20 40 59.6	0.179	12	8 47 39.74	2.5152	17 58 36.2	6.596
13	6 50 37.71	2.4365	20 40 45.0	0.308	13	8 50 10.65	2.5150	17 51 56.6	6.725
14	6 53 4.00	2.4399	20 40 22.6	0.437	14	8 52 41.55	2.5148	17 45 9.2	6.854
15	6 55 30.50	2.4432	20 39 52.4	0.567	15	8 55 12.43	2.5145	17 38 14.1	6.982
16	6 57 57.19	2.4464	20 39 14.5	0.697	16	8 57 43.29	2.5141	17 31 11.4	7.109
17	7 0 24.07	2.4496	20 38 28.7	0.828	17	9 0 14.12	2.5137	17 24 1.1	7.235
18	7 2 51.14	2.4527	20 37 35.1	0.960	18	9 2 44.93	2.5132	17 16 43.2	7.361
19	7 5 18.40	2.4558	20 36 33.5	1.092	19	9 5 15.70	2.5126	17 9 17.8	7.486
20	7 7 45.84	2.4588	20 35 24.0	1.224	20	9 7 46.44	2.5119	17 1 44.9	7.610
21	7 10 13.46	2.4617	20 34 6.5	1.357	21	9 10 17.13	2.5112	16 54 4.6	7.734
22	7 12 41.25	2.4646	20 32 41.1	1.490	22	9 12 47.78	2.5105	16 46 16.8	7.856
23	7 15 9.21	2.4673	N. 20 31 7.7	1.624	23	9 15 18.39	2.5097	N. 16 38 21.7	7.978
24	7 17 37.33	2.4700				9 17 48.95	2.5088		
THURSDAY 2.					SATURDAY 4.				
0	h m s	s	N. 20° 29' 26.2"	1.758	0	h m s	s	N. 16° 30' 19.4"	8.099
1	7 20 5.61	2.4726	20 27 36.7	1.892	1	9 20 19.45	2.5078	16 22 9.9	8.219
2	7 22 34.05	2.4752	20 25 39.1	2.026	2	9 22 49.89	2.5068	16 13 53.1	8.338
3	7 25 2.64	2.4777	20 23 33.5	2.161	3	9 25 20.27	2.5058	16 5 29.2	8.457
4	7 27 31.37	2.4801	20 21 19.8	2.295	4	9 27 50.58	2.5047	15 56 58.3	8.574
5	7 30 0.25	2.4824	20 18 58.0	2.430	5	9 30 20.83	2.5035	15 48 20.4	8.691
6	7 32 29.26	2.4846	20 16 28.2	2.565	6	9 32 51.01	2.5023	15 39 35.4	8.806
7	7 34 58.40	2.4867	20 13 50.2	2.701	7	9 35 21.10	2.5010	15 30 43.6	8.920
8	7 37 27.67	2.4888	20 11 4.0	2.836	8	9 37 51.11	2.4996	15 21 45.0	9.033
9	7 39 57.06	2.4908	20 8 9.7	2.972	9	9 40 21.05	2.4983	15 12 39.6	9.145
10	7 42 26.57	2.4928	20 5 7.3	3.108	10	9 42 50.91	2.4969	15 3 27.6	9.256
11	7 44 56.20	2.4946	20 1 56.7	3.244	11	9 45 20.68	2.4955	14 54 8.9	9.367
12	7 47 25.93	2.4964	19 58 38.0	3.381	12	9 47 50.37	2.4941	14 44 43.6	9.476
13	7 49 55.77	2.4981	19 55 11.1	3.517	13	9 50 19.97	2.4925	14 35 11.9	9.583
14	7 52 25.71	2.4997	19 51 36.0	3.653	14	9 52 49.47	2.4908	14 25 33.7	9.689
15	7 54 55.74	2.5012	19 47 52.8	3.788	15	9 55 18.87	2.4892	14 15 49.2	9.794
16	7 57 25.86	2.5027	19 44 1.4	3.924	16	9 57 48.17	2.4875	13 5 58.4	9.898
17	7 59 56.07	2.5041	19 40 1.9	4.060	17	10 0 17.37	2.4858	13 56 1.5	10.000
18	8 2 26.36	2.5054	19 35 54.2	4.196	18	10 2 46.47	2.4841	13 45 58.4	10.101
19	8 4 56.72	2.5066	19 31 38.4	4.332	19	10 5 15.46	2.4823	13 35 49.2	10.202
20	8 7 27.15	2.5078	19 27 14.4	4.468	20	10 7 44.34	2.4805	13 25 34.1	10.301
21	8 9 57.65	2.5088	19 22 42.3	4.603	21	10 10 13.12	2.4787	13 15 13.1	10.398
22	8 12 28.21	2.5098	19 18 2.1	4.738	22	10 12 41.79	2.4768	13 4 46.3	10.494
23	8 14 58.82	2.5107	19 13 13.8	4.873	23	10 15 10.34	2.4749	12 54 13.8	10.589
24	8 17 29.49	2.5115	N. 19° 8' 17.3"	5.008	24	10 17 38.78	2.4730		
	8 20 0.20	2.5122				10 20 7.10	2.4711		



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 5.					TUESDAY 7.				
0	10 20 7.10	2.4711	N. 12 43 35.6	10.683	0	12 16 19.96	2.3735	N. 2 52 31.9	13.311
1	10 22 35.30	2.4691	12 32 51.8	10.775	1	12 18 42.32	2.3718	2 39 12.8	13.324
2	10 25 3.39	2.4671	12 22 2.6	10.866	2	12 21 4.58	2.3701	2 25 53.0	13.336
3	10 27 31.36	2.4651	12 11 8.0	10.955	3	12 23 26.74	2.3685	2 12 32.5	13.347
4	10 29 59.20	2.4631	12 0 8.0	11.042	4	12 25 48.80	2.3669	1 59 11.4	13.356
5	10 32 26.92	2.4610	11 49 2.8	11.128	5	12 28 10.77	2.3653	1 45 49.9	13.362
6	10 34 54.53	2.4589	11 37 52.6	11.213	6	12 30 32.64	2.3637	1 32 28.0	13.367
7	10 37 22.01	2.4568	11 26 37.3	11.297	7	12 32 54.42	2.3622	1 19 5.9	13.370
8	10 39 49.35	2.4547	11 15 17.0	11.378	8	12 35 16.11	2.3607	1 5 43.6	13.372
9	10 42 16.57	2.4527	11 3 51.9	11.458	9	12 37 37.71	2.3592	0 52 21.3	13.372
10	10 44 43.67	2.4506	10 52 22.0	11.537	10	12 39 59.22	2.3578	0 38 59.0	13.370
11	10 47 10.64	2.4485	10 40 47.4	11.615	11	12 42 20.65	2.3564	0 25 36.9	13.367
12	10 49 37.49	2.4464	10 29 8.2	11.690	12	12 44 41.99	2.3550	N. 0 12 15.0	13.362
13	10 52 4.21	2.4442	10 17 24.5	11.764	13	12 47 3.25	2.3537	S. 0 1 6.5	13.355
14	10 54 30.79	2.4420	10 5 36.5	11.837	14	12 49 24.43	2.3524	0 14 27.6	13.347
15	10 56 57.24	2.4398	9 53 44.2	11.908	15	12 51 45.53	2.3511	0 27 48.2	13.337
16	10 59 23.57	2.4377	9 41 47.6	11.977	16	12 54 6.56	2.3499	0 41 8.1	13.325
17	11 1 49.77	2.4356	9 29 46.9	12.045	17	12 56 27.52	2.3487	0 54 27.3	13.312
18	11 4 15.84	2.4334	9 17 42.2	12.111	18	12 58 48.40	2.3475	1 7 45.6	13.298
19	11 6 41.78	2.4312	9 5 33.6	12.175	19	13 1 9.21	2.3463	1 21 3.0	13.282
20	11 9 7.59	2.4290	8 53 21.2	12.238	20	13 3 29.95	2.3451	1 34 19.4	13.264
21	11 11 33.27	2.4269	8 41 5.1	12.299	21	13 5 50.62	2.3440	1 47 34.7	13.244
22	11 13 58.82	2.4248	8 28 45.3	12.359	22	13 8 11.23	2.3430	2 0 48.7	13.223
23	11 16 24.24	2.4227	N. 8 16 22.0	12.417	23	13 10 31.78	2.3420	S. 2 14 1.4	13.200
MONDAY 6.					WEDNESDAY 8.				
0	11 18 49.54	2.4205	N. 8 3 55.3	12.473	0	13 12 52.27	2.3410	S. 2 27 12.7	13.176
1	11 21 14.71	2.4183	7 51 25.3	12.528	1	13 15 12.70	2.3400	2 40 22.5	13.150
2	11 23 39.74	2.4162	7 38 52.0	12.580	2	13 17 33.07	2.3390	2 53 30.7	13.123
3	11 26 4.65	2.4141	7 26 15.6	12.631	3	13 19 53.38	2.3381	3 6 37.2	13.094
4	11 28 29.43	2.4120	7 13 36.3	12.680	4	13 22 13.64	2.3372	3 19 42.0	13.064
5	11 30 54.09	2.4100	7 0 54.0	12.728	5	13 24 33.85	2.3364	3 32 44.9	13.033
6	11 33 18.63	2.4079	6 48 8.9	12.774	6	13 26 54.01	2.3356	3 45 45.9	12.999
7	11 35 43.04	2.4058	6 35 21.1	12.819	7	13 29 14.12	2.3348	3 58 44.8	12.964
8	11 38 7.33	2.4037	6 22 30.6	12.862	8	13 31 34.19	2.3340	4 11 41.6	12.928
9	11 40 31.49	2.4017	6 9 37.6	12.903	9	13 33 54.21	2.3333	4 24 36.2	12.890
10	11 42 55.53	2.3997	5 56 42.2	12.942	10	13 36 14.19	2.3326	4 37 28.4	12.851
11	11 45 19.45	2.3977	5 43 44.5	12.980	11	13 38 34.13	2.3320	4 50 18.2	12.810
12	11 47 43.25	2.3957	5 30 44.6	13.016	12	13 40 54.03	2.3314	5 3 5.6	12.768
13	11 50 6.93	2.3937	5 17 42.6	13.050	13	13 43 13.89	2.3308	5 15 50.4	12.725
14	11 52 30.49	2.3917	5 4 38.6	13.082	14	13 45 33.72	2.3302	5 28 32.6	12.680
15	11 54 53.94	2.3898	4 51 32.7	13.112	15	13 47 53.52	2.3297	5 41 12.0	12.633
16	11 57 17.27	2.3879	4 38 25.1	13.141	16	13 50 13.28	2.3292	5 53 48.6	12.585
17	11 59 40.49	2.3861	4 25 15.8	13.168	17	13 52 33.01	2.3287	6 6 22.3	12.537
18	12 2 3.60	2.3842	4 12 4.9	13.194	18	13 54 52.72	2.3282	6 18 53.0	12.487
19	12 4 26.60	2.3823	3 58 52.5	13.218	19	13 57 12.40	2.3278	6 31 20.7	12.435
20	12 6 49.48	2.3805	3 45 38.7	13.240	20	13 59 32.05	2.3273	6 43 45.2	12.382
21	12 9 12.26	2.3787	3 32 23.6	13.261	21	14 1 51.68	2.3269	6 56 6.5	12.328
22	12 11 34.93	2.3769	3 19 7.4	13.280	22	14 4 11.28	2.3265	7 8 24.5	12.272
23	12 13 57.50	2.3752	3 5 50.1	13.296	23	14 6 30.86	2.3262	7 20 39.1	12.215
24	12 16 19.96	2.3735	N. 2 52 31.9	13.311	24	14 8 50.43	2.3259	S. 7 32 50.3	12.157

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 9.					SATURDAY 11.				
0	14 8 50.43	2.3259	S. 7° 32' 50.3"	12.157	0	16 0 27.38	2.3279	S. 15° 48' 22.1"	8.133
1	14 11 9.98	2.3257	7 44 58.0	12.098	1	16 2 47.06	2.3280	15 56 27.0	8.029
2	14 13 29.51	2.3254	7 57 2.0	12.037	2	16 5 6.74	2.3281	16 4 25.6	7.925
3	14 15 49.03	2.3252	8 9 2.4	11.975	3	16 7 26.43	2.3282	16 12 17.9	7.820
4	14 18 8.53	2.3249	8 20 59.0	11.912	4	16 9 46.12	2.3283	16 20 4.0	7.714
5	14 20 28.02	2.3247	8 32 51.8	11.848	5	16 12 5.81	2.3283	16 27 43.7	7.608
6	14 22 47.49	2.3245	8 44 40.7	11.782	6	16 14 25.51	2.3283	16 35 17.0	7.502
7	14 25 6.95	2.3243	8 56 25.6	11.715	7	16 16 45.21	2.3283	16 42 43.9	7.396
8	14 27 26.41	2.3242	9 8 6.5	11.647	8	16 19 4.90	2.3283	16 50 4.5	7.288
9	14 29 45.86	2.3242	9 19 43.3	11.578	9	16 21 24.59	2.3282	16 57 18.6	7.180
10	14 32 5.31	2.3241	9 31 15.9	11.508	10	16 23 44.28	2.3281	17 4 26.1	7.071
11	14 34 24.75	2.3240	9 42 44.2	11.437	11	16 26 3.96	2.3280	17 11 27.1	6.962
12	14 36 44.19	2.3239	9 54 8.3	11.365	12	16 28 23.64	2.3279	17 18 21.6	6.853
13	14 39 3.63	2.3239	10 5 28.0	11.291	13	16 30 43.31	2.3278	17 25 9.5	6.743
14	14 41 23.06	2.3239	10 16 43.2	11.216	14	16 33 2.98	2.3277	17 31 50.8	6.633
15	14 43 42.49	2.3239	10 27 53.9	11.140	15	16 35 22.64	2.3275	17 38 25.5	6.523
16	14 46 1.93	2.3239	10 39 0.0	11.063	16	16 37 42.28	2.3274	17 44 53.6	6.412
17	14 48 21.37	2.3240	10 50 1.4	10.985	17	16 40 1.91	2.3273	17 51 15.0	6.301
18	14 50 40.81	2.3240	11 0 58.2	10.906	18	16 42 21.54	2.3270	17 57 29.7	6.190
19	14 53 0.25	2.3241	11 11 50.2	10.827	19	16 44 41.15	2.3267	18 3 37.7	6.078
20	14 55 19.70	2.3241	11 22 37.4	10.746	20	16 47 0.74	2.3264	18 9 39.0	5.966
21	14 57 39.15	2.3242	11 33 19.7	10.664	21	16 49 20.32	2.3261	18 15 33.5	5.853
22	14 59 58.60	2.3243	11 43 57.1	10.581	22	16 51 39.87	2.3256	18 21 21.3	5.740
23	15 2 18.06	2.3244	S. 11° 54' 29.4"	10.497	23	16 53 59.40	2.3254	S. 18° 27' 2.3"	5.627
FRIDAY 10.					SUNDAY 12.				
0	15 4 37.53	2.3245	S. 12° 4' 56.7"	10.412	0	16 56 18.91	2.3250	S. 18° 32' 36.5"	5.514
1	15 6 57.01	2.3247	12 15 18.9	10.327	1	16 58 38.40	2.3246	18 38 3.9	5.400
2	15 9 16.49	2.3248	12 25 35.9	10.241	2	17 0 57.86	2.3241	18 43 24.5	5.286
3	15 11 35.98	2.3249	12 35 47.7	10.153	3	17 3 17.29	2.3236	18 48 38.2	5.172
4	15 13 55.48	2.3250	12 45 54.3	10.065	4	17 5 36.69	2.3231	18 53 45.1	5.058
5	15 16 14.99	2.3252	12 55 55.5	9.976	5	17 7 56.06	2.3226	18 58 45.1	4.943
6	15 18 34.50	2.3253	13 5 51.4	9.885	6	17 10 15.40	2.3220	19 3 38.2	4.828
7	15 20 54.02	2.3255	13 15 41.8	9.794	7	17 12 34.70	2.3214	19 8 24.4	4.713
8	15 23 13.56	2.3256	13 25 26.7	9.702	8	17 14 53.97	2.3208	19 13 3.8	4.598
9	15 25 33.11	2.3258	13 35 6.1	9.610	9	17 17 13.20	2.3201	19 17 36.3	4.483
10	15 27 52.66	2.3260	13 44 30.9	9.517	10	17 19 32.38	2.3194	19 22 1.8	4.368
11	15 30 12.22	2.3262	13 54 8.1	9.423	11	17 21 51.52	2.3186	19 26 20.4	4.252
12	15 32 31.80	2.3263	14 3 30.6	9.328	12	17 24 10.61	2.3178	19 30 32.0	4.137
13	15 34 51.39	2.3265	14 12 47.4	9.233	13	17 26 29.65	2.3170	19 34 36.7	4.021
14	15 37 10.98	2.3266	14 21 58.4	9.135	14	17 28 48.65	2.3162	19 38 34.5	3.905
15	15 39 30.58	2.3268	14 31 3.6	9.038	15	17 31 7.59	2.3153	19 42 25.3	3.789
16	15 41 50.19	2.3269	14 40 2.9	8.940	16	17 33 26.49	2.3144	19 46 9.2	3.673
17	15 44 9.81	2.3271	14 48 56.3	8.842	17	17 35 45.33	2.3134	19 49 46.1	3.557
18	15 46 29.44	2.3272	14 57 43.9	8.743	18	17 38 4.10	2.3124	19 53 16.0	3.441
19	15 48 49.08	2.3274	15 6 25.5	8.643	19	17 40 22.81	2.3114	19 56 39.0	3.325
20	15 51 8.73	2.3275	15 15 1.0	8.542	20	17 42 41.47	2.3103	19 59 55.0	3.209
21	15 53 28.38	2.3276	15 23 30.5	8.440	21	17 45 0.06	2.3092	20 3 4.1	3.093
22	15 55 48.04	2.3277	15 31 53.8	8.338	22	17 47 18.57	2.3080	20 6 6.2	2.977
23	15 58 7.71	2.3278	15 40 11.0	8.236	23	17 49 37.01	2.3068	20 9 1.4	2.862
24	16 0 27.38	2.3279	S. 15° 48' 22.1"	8.133	24	17 51 55.39	2.3056	S. 20° 11' 49.6"	2.746

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 13.					WEDNESDAY 15.				
0	17 51 55.39	2.3056	S. 20° 11' 49.6"	2.746	0	19 40 26.78	2.2023	S. 20° 13' 37.3"	2.551
1	17 54 13.69	2.3043	20 14 30.9	2.630	1	19 42 38.83	2.1994	20 11 1.2	2.652
2	17 56 31.91	2.3031	20 17 5.2	2.514	2	19 44 50.71	2.1964	20 8 19.0	2.752
3	17 58 50.05	2.3018	20 19 32.6	2.398	3	19 47 2.41	2.1934	20 5 30.8	2.852
4	18 1 8.12	2.3004	20 21 53.0	2.282	4	19 49 13.92	2.1904	20 2 36.7	2.951
5	18 3 26.10	2.2989	20 24 6.5	2.167	5	19 51 25.25	2.1873	19 59 36.7	3.050
6	18 5 43.99	2.2974	20 26 13.1	2.052	6	19 53 36.40	2.1843	19 56 30.7	3.149
7	18 8 1.79	2.2959	20 28 12.8	1.937	7	19 55 47.37	2.1813	19 53 18.8	3.247
8	18 10 19.50	2.2944	20 30 5.5	1.822	8	19 57 58.15	2.1782	19 50 1.1	3.344
9	18 12 37.12	2.2928	20 31 51.3	1.707	9	20 0 8.74	2.1750	19 46 37.6	3.440
10	18 14 54.64	2.2913	20 33 30.3	1.592	10	20 2 19.15	2.1719	19 43 8.3	3.536
11	18 17 12.06	2.2895	20 35 2.4	1.477	11	20 4 29.37	2.1687	19 39 33.3	3.632
12	18 19 29.38	2.2878	20 36 27.6	1.362	12	20 6 39.39	2.1655	19 35 52.5	3.727
13	18 21 46.60	2.2861	20 37 45.9	1.248	13	20 8 49.22	2.1623	19 32 6.1	3.821
14	18 24 3.71	2.2843	20 38 57.4	1.134	14	20 10 58.87	2.1591	19 28 14.0	3.915
15	18 26 20.71	2.2825	20 40 2.1	1.021	15	20 13 8.32	2.1558	19 24 16.3	4.008
16	18 28 37.61	2.2806	20 40 59.9	0.907	16	20 15 17.57	2.1526	19 20 13.1	4.101
17	18 30 54.39	2.2787	20 41 50.9	0.793	17	20 17 26.63	2.1493	19 16 4.3	4.193
18	18 33 11.06	2.2768	20 42 35.1	0.680	18	20 19 35.49	2.1461	19 11 50.0	4.284
19	18 35 27.61	2.2748	20 43 12.5	0.567	19	20 21 44.16	2.1428	19 7 30.3	4.374
20	18 37 44.04	2.2728	20 43 43.2	0.454	20	20 23 52.63	2.1396	19 3 5.1	4.464
21	18 40 0.35	2.2708	20 44 7.1	0.342	21	20 26 0.90	2.1363	18 58 34.5	4.554
22	18 42 16.54	2.2687	20 44 24.3	0.230	22	20 28 8.98	2.1330	18 53 58.6	4.643
23	18 44 32.60	2.2666	S. 20 44 34.7	0.118	23	20 30 16.86	2.1296	S. 18 49 17.4	4.731
TUESDAY 14.					THURSDAY 16.				
0	18 46 48.53	2.2644	S. 20 44 38.5	0.007	0	20 32 24.53	2.1263	S. 18 44 30.9	4.819
1	18 49 4.33	2.2622	20 44 35.6	0.104	1	20 34 32.00	2.1229	18 39 39.2	4.906
2	18 51 19.99	2.2600	20 44 26.0	0.215	2	20 36 39.28	2.1196	18 34 42.2	4.992
3	18 53 35.52	2.2577	20 44 9.8	0.326	3	20 38 46.36	2.1163	18 29 40.1	5.078
4	18 55 50.91	2.2554	20 43 47.0	0.435	4	20 40 53.23	2.1130	18 24 32.9	5.163
5	18 58 6.17	2.2531	20 43 17.6	0.545	5	20 42 59.90	2.1096	18 19 20.6	5.247
6	19 0 21.28	2.2507	20 42 41.6	0.654	6	20 45 6.38	2.1062	18 14 3.3	5.331
7	19 2 36.24	2.2482	20 41 59.1	0.763	7	20 47 12.65	2.1028	18 8 40.9	5.414
8	19 4 51.06	2.2458	20 41 10.0	0.872	8	20 49 18.72	2.0994	18 3 13.6	5.496
9	19 7 5.73	2.2433	20 40 14.4	0.980	9	20 51 24.59	2.0961	17 57 41.3	5.578
10	19 9 20.26	2.2408	20 39 12.4	1.088	10	20 53 30.25	2.0927	17 52 4.2	5.660
11	19 11 34.63	2.2382	20 38 3.9	1.196	11	20 55 35.71	2.0893	17 46 22.2	5.741
12	19 13 48.85	2.2356	20 36 48.9	1.303	12	20 57 40.97	2.0860	17 40 35.3	5.820
13	19 16 2.91	2.2330	20 35 27.5	1.409	13	20 59 46.03	2.0827	17 34 43.7	5.899
14	19 18 16.81	2.2304	20 33 59.8	1.515	14	21 1 50.89	2.0793	17 28 47.4	5.978
15	19 20 30.55	2.2277	20 32 25.7	1.621	15	21 3 55.55	2.0759	17 22 46.4	6.056
16	19 22 44.13	2.2250	20 30 45.3	1.727	16	21 6 0.00	2.0725	17 16 40.7	6.133
17	19 24 57.55	2.2223	20 28 58.5	1.832	17	21 8 4.25	2.0692	17 10 30.4	6.210
18	19 27 10.81	2.2195	20 27 5.5	1.936	18	21 10 8.30	2.0658	17 4 15.5	6.286
19	19 29 23.90	2.2167	20 25 6.3	2.039	19	21 12 12.15	2.0625	16 57 56.1	6.361
20	19 31 36.82	2.2139	20 23 0.8	2.143	20	21 14 15.80	2.0591	16 51 32.2	6.435
21	19 33 49.57	2.2110	20 20 49.1	2.246	21	21 16 19.25	2.0558	16 45 3.9	6.509
22	19 36 2.15	2.2081	20 18 31.3	2.348	22	21 18 22.50	2.0525	16 38 31.1	6.582
23	19 38 14.55	2.2052	20 16 7.3	2.450	23	21 20 25.55	2.0492	16 31 54.0	6.655
24	19 40 26.78	2.2023	S. 20 13 37.3	2.551	24	21 22 28.40	2.0459	S. 16 25 12.5	6.727

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 17.					SUNDAY 19.				
0	<sup>h</sup> 21 <sup>m</sup> 22 <sup>s</sup> 28.40	2.0459	S. 16° 25' 12.5"	6.737	0	<sup>h</sup> 22 <sup>m</sup> 57 <sup>s</sup> 11.01	1.9092	S. 9° 52' 35.8"	9.369
1	21 24 31.05	2.0426	16 18 26.8	6.798	1	22 59 5.50	1.9070	9 43 12.5	9.408
2	21 26 33.51	2.0393	16 11 36.8	6.868	2	23 0 59.85	1.9048	9 33 46.9	9.445
3	21 28 35.77	2.0360	16 4 42.6	6.938	3	23 2 54.07	1.9027	9 24 19.1	9.482
4	21 30 37.83	2.0328	15 57 44.2	7.007	4	23 4 48.17	1.9006	9 14 49.1	9.518
5	21 32 39.70	2.0296	15 50 41.7	7.076	5	23 6 42.14	1.8985	9 5 16.9	9.554
6	21 34 41.38	2.0263	15 43 35.1	7.143	6	23 8 35.99	1.8965	8 55 42.6	9.589
7	21 36 42.86	2.0231	15 36 24.5	7.210	7	23 10 29.72	1.8945	8 46 6.2	9.623
8	21 38 44.15	2.0199	15 29 9.9	7.276	8	23 12 23.33	1.8926	8 36 27.8	9.657
9	21 40 45.25	2.0167	15 21 51.3	7.342	9	23 14 16.83	1.8907	8 26 47.4	9.690
10	21 42 46.15	2.0135	15 14 28.8	7.407	10	23 16 10.21	1.8888	8 17 5.0	9.723
11	21 44 46.86	2.0103	15 7 2.4	7.472	11	23 18 3.48	1.8869	8 7 20.7	9.755
12	21 46 47.39	2.0072	14 59 32.2	7.535	12	23 19 56.64	1.8851	7 57 34.4	9.788
13	21 48 47.73	2.0041	14 51 58.2	7.598	13	23 21 49.69	1.8833	7 47 46.3	9.816
14	21 50 47.88	2.0009	14 44 20.4	7.660	14	23 23 42.64	1.8815	7 37 56.5	9.846
15	21 52 47.84	1.9978	14 36 38.9	7.722	15	23 25 35.48	1.8798	7 28 4.9	9.875
16	21 54 47.62	1.9947	14 28 53.8	7.783	16	23 27 28.22	1.8782	7 18 11.5	9.903
17	21 56 47.21	1.9917	14 21 5.1	7.843	17	23 29 20.86	1.8766	7 8 16.5	9.931
18	21 58 46.62	1.9887	14 13 12.7	7.902	18	23 31 13.41	1.8750	6 58 19.8	9.958
19	22 0 45.85	1.9857	14 5 16.8	7.961	19	23 33 5.86	1.8734	6 48 21.5	9.984
20	22 2 44.90	1.9827	13 57 17.4	8.019	20	23 34 58.22	1.8719	6 38 21.7	10.010
21	22 4 43.77	1.9797	13 49 14.5	8.077	21	23 36 50.49	1.8704	6 28 20.3	10.036
22	22 6 42.46	1.9767	13 41 8.2	8.134	22	23 38 42.67	1.8690	6 18 17.4	10.060
23	22 8 40.98	1.9738	S. 13° 32' 58.5"	8.190	23	23 40 34.77	1.8676	S. 6° 8' 13.1"	10.084
SATURDAY 18.					MONDAY 20.				
0	22 10 39.32	1.9709	S. 13° 24' 45.4"	8.245	0	23 42 26.78	1.8662	S. 5° 58' 7.3"	10.107
1	22 12 37.49	1.9680	13 16 29.0	8.300	1	23 44 18.71	1.8649	5 48 0.1	10.130
2	22 14 35.48	1.9651	13 8 9.4	8.354	2	23 46 10.57	1.8636	5 37 51.7	10.152
3	22 16 33.30	1.9623	12 59 46.6	8.407	3	23 48 2.35	1.8623	5 27 42.0	10.173
4	22 18 30.96	1.9595	12 51 20.6	8.460	4	23 49 54.05	1.8311	5 17 31.0	10.193
5	22 20 28.45	1.9567	12 42 51.5	8.512	5	23 51 45.68	1.8600	5 7 18.8	10.213
6	22 22 25.77	1.9539	12 34 19.2	8.563	6	23 53 37.25	1.8589	4 57 5.4	10.233
7	22 24 22.93	1.9512	12 25 43.9	8.613	7	23 55 28.75	1.8578	4 46 50.9	10.252
8	22 26 19.92	1.9485	12 17 5.5	8.663	8	23 57 20.19	1.8567	4 36 35.2	10.270
9	22 28 16.75	1.9459	12 8 24.2	8.712	9	23 59 11.56	1.8557	4 26 18.5	10.287
10	22 30 13.43	1.9432	11 59 40.0	8.761	10	0 1 2.87	1.8547	4 16 0.8	10.304
11	22 32 9.94	1.9406	11 50 52.9	8.809	11	0 2 54.12	1.8536	4 5 42.1	10.320
12	22 34 6.30	1.9380	11 42 2.9	8.856	12	0 4 45.32	1.8529	3 55 22.4	10.335
13	22 36 2.50	1.9354	11 33 10.1	8.903	13	0 6 36.47	1.8521	3 45 1.8	10.350
14	22 37 58.55	1.9329	11 24 14.5	8.948	14	0 8 27.57	1.8513	3 34 40.4	10.364
15	22 39 54.45	1.9304	11 15 16.2	8.993	15	0 10 18.62	1.8505	3 24 18.2	10.378
16	22 41 50.20	1.9279	11 6 15.3	9.038	16	0 12 9.63	1.8498	3 13 55.1	10.391
17	22 43 45.80	1.9254	10 57 11.7	9.082	17	0 14 0.59	1.8491	3 3 31.3	10.403
18	22 45 41.25	1.9230	10 48 5.5	9.126	18	0 15 51.52	1.8485	2 53 6.7	10.415
19	22 47 36.56	1.9207	10 38 56.7	9.167	19	0 17 42.41	1.8479	2 42 41.5	10.428
20	22 49 31.73	1.9183	10 29 45.4	9.209	20	0 19 33.27	1.8473	2 32 15.6	10.436
21	22 51 26.75	1.9159	10 20 31.6	9.250	21	0 21 24.10	1.8468	2 21 49.1	10.446
22	22 53 21.64	1.9136	10 11 15.4	9.290	22	0 23 14.89	1.8463	2 11 22.1	10.455
23	22 55 16.39	1.9114	10 1 56.8	9.330	23	0 25 5.65	1.8458	2 0 54.6	10.463
24	22 57 11.01	1.9092	S. 9° 52' 35.8"	9.369	24	0 26 56.39	1.8455	S. 1° 50' 26.5"	10.471

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 21.					THURSDAY 23.				
0	<sup>h</sup> 0 <sup>m</sup> 26 <sup>s</sup> 56.39	1.8455	S. 1° 50' 26.5"	10.471	0	<sup>h</sup> 1 <sup>m</sup> 55 <sup>s</sup> 53.55	1.8775	N. 6° 29' 7.9"	10.100
1	0 28 47.11	1.8459	1 39 58.0	10.478	1	1 57 46.25	1.8799	6 39 13.2	10.076
2	0 30 37.81	1.8449	1 29 29.1	10.485	2	1 59 39.06	1.8810	6 49 17.0	10.052
3	0 32 28.49	1.8446	1 18 59.8	10.491	3	2 1 31.97	1.8828	6 59 19.4	10.027
4	0 34 19.16	1.8444	1 8 30.2	10.498	4	2 3 24.99	1.8846	7 9 20.3	10.002
5	0 36 9.81	1.8442	0 58 0.3	10.500	5	2 5 18.12	1.8855	7 19 19.6	9.976
6	0 38 0.46	1.8441	0 47 30.2	10.504	6	2 7 11.37	1.8884	7 29 17.4	9.949
7	0 39 51.10	1.8440	0 36 59.8	10.508	7	2 9 4.73	1.8904	7 39 13.5	9.922
8	0 41 41.74	1.8439	0 26 29.2	10.511	8	2 10 58.22	1.8934	7 49 8.0	9.894
9	0 43 32.37	1.8439	0 15 58.5	10.513	9	2 12 51.83	1.8945	7 59 0.8	9.865
10	0 45 23.01	1.8440	S. 0 5 27.7	10.514	10	2 14 45.56	1.8966	8 8 51.8	9.835
11	0 47 13.65	1.8441	N. 0 5 3.2	10.515	11	2 16 39.42	1.8988	8 18 41.0	9.805
12	0 49 4.30	1.8442	0 15 34.1	10.515	12	2 18 33.42	1.9010	8 28 28.4	9.774
13	0 50 54.96	1.8444	0 26 5.0	10.515	13	2 20 27.55	1.9032	8 38 13.9	9.743
14	0 52 45.63	1.8446	0 36 35.9	10.514	14	2 22 21.81	1.9055	8 47 57.6	9.711
15	0 54 36.31	1.8448	0 47 6.7	10.512	15	2 24 16.21	1.9078	8 57 39.3	9.678
16	0 56 27.01	1.8450	0 57 37.4	10.510	16	2 26 10.74	1.9101	9 7 19.0	9.645
17	0 58 17.72	1.8453	1 8 7.9	10.507	17	2 28 5.42	1.9125	9 16 56.7	9.619
18	1 0 8.45	1.8457	1 18 38.2	10.503	18	2 30 0.24	1.9149	9 26 32.4	9.577
19	1 1 59.21	1.8462	1 29 8.3	10.499	19	2 31 55.21	1.9174	9 36 5.9	9.541
20	1 3 50.00	1.8467	1 39 38.1	10.494	20	2 33 50.33	1.9199	9 45 37.3	9.505
21	1 5 40.82	1.8472	1 50 7.6	10.489	21	2 35 45.60	1.9225	9 55 6.5	9.468
22	1 7 31.67	1.8477	2 0 36.8	10.483	22	2 37 41.03	1.9251	10 4 33.4	9.430
23	1 9 22.55	1.8483	N. 2 11 5.6	10.476	23	2 39 36.61	1.9277	N.10 13 58.0	9.388
WEDNESDAY 22.					FRIDAY 24.				
0	1 11 13.47	1.8490	N. 2 21 33.9	10.469	0	2 41 32.35	1.9303	N.10 23 20.4	9.353
1	1 13 4.43	1.8497	2 32 1.8	10.461	1	2 43 28.25	1.9330	10 32 40.4	9.313
2	1 14 55.43	1.8504	2 42 29.2	10.452	2	2 45 24.31	1.9358	10 41 58.0	9.273
3	1 16 46.48	1.8512	2 52 56.0	10.443	3	2 47 20.54	1.9386	10 51 13.1	9.232
4	1 18 37.58	1.8520	3 3 22.3	10.433	4	2 49 16.94	1.9414	11 0 25.8	9.190
5	1 20 28.73	1.8529	3 13 48.0	10.423	5	2 51 13.51	1.9443	11 9 35.9	9.148
6	1 22 19.93	1.8538	3 24 13.0	10.411	6	2 53 10.26	1.9472	11 18 43.5	9.105
7	1 24 11.19	1.8548	3 34 37.3	10.399	7	2 55 7.18	1.9502	11 27 48.5	9.061
8	1 26 2.50	1.8558	3 45 0.9	10.386	8	2 57 4.28	1.9531	11 36 50.8	9.016
9	1 27 53.87	1.8568	3 55 23.7	10.373	9	2 59 1.56	1.9561	11 45 50.4	8.971
10	1 29 45.31	1.8579	4 5 45.7	10.360	10	3 0 59.01	1.9591	11 54 47.3	8.925
11	1 31 36.82	1.8590	4 16 6.9	10.346	11	3 2 56.65	1.9622	12 3 41.4	8.879
12	1 33 28.39	1.8602	4 26 27.2	10.331	12	3 4 54.47	1.9653	12 12 32.8	8.831
13	1 35 20.04	1.8614	4 36 46.6	10.315	13	3 6 52.48	1.9684	12 21 21.3	8.783
14	1 37 11.76	1.8626	4 47 5.0	10.299	14	3 8 50.68	1.9716	12 30 6.8	8.734
15	1 39 3.56	1.8639	4 57 22.4	10.282	15	3 10 49.07	1.9748	12 38 49.4	8.685
16	1 40 55.43	1.8652	5 7 38.8	10.264	16	3 12 47.66	1.9781	12 47 29.0	8.634
17	1 42 47.38	1.8665	5 17 54.1	10.246	17	3 14 46.45	1.9814	12 56 5.5	8.583
18	1 44 39.41	1.8679	5 28 8.3	10.227	18	3 16 45.43	1.9847	13 4 39.0	8.532
19	1 46 31.53	1.8694	5 38 21.3	10.208	19	3 18 44.61	1.9881	13 13 9.4	8.480
20	1 48 23.74	1.8710	5 48 33.2	10.188	20	3 20 44.00	1.9914	13 21 36.6	8.427
21	1 50 16.05	1.8726	5 58 43.8	10.167	21	3 22 43.59	1.9948	13 30 0.6	8.373
22	1 52 8.45	1.8742	6 8 53.2	10.145	22	3 24 43.38	1.9983	13 38 21.3	8.318
23	1 54 0.95	1.8758	6 19 1.2	10.123	23	3 26 43.38	2.0018	13 46 38.7	8.263
24	1 55 53.55	1.8775	N. 6 29 7.9	10.100	24	3 28 43.60	2.0053	N.13 54 52.8	8.206

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 25.					MONDAY 27.				
0	3 <sup>h</sup> 28 <sup>m</sup> 43.60 <sup>s</sup>	2.0053	N.13° 54' 52.8"	8.306	0	5 <sup>h</sup> 9 <sup>m</sup> 28.32 <sup>s</sup>	2.1980	N.19° 9' 45.5"	4.616
1	3 30 44.03	2.0089	14 3 3.5	8.149	1	5 11 40.33	2.2023	19 14 19.7	4.522
2	3 32 44.67	2.0125	14 11 10.7	8.092	2	5 13 52.59	2.2065	19 18 48.2	4.428
3	3 34 45.53	2.0161	14 19 14.5	8.034	3	5 16 5.11	2.2107	19 23 11.1	4.333
4	3 36 46.60	2.0197	14 27 14.8	7.975	4	5 18 17.87	2.2149	19 27 28.2	4.237
5	3 38 47.89	2.0233	14 35 11.5	7.915	5	5 20 30.88	2.2190	19 31 39.5	4.140
6	3 40 49.39	2.0270	14 43 4.6	7.854	6	5 22 44.15	2.2232	19 35 45.0	4.042
7	3 42 51.12	2.0307	14 50 54.0	7.793	7	5 24 57.67	2.2273	19 39 44.6	3.944
8	3 44 53.07	2.0344	14 58 39.8	7.731	8	5 27 11.43	2.2315	19 43 38.3	3.845
9	3 46 55.25	2.0382	15 6 21.8	7.668	9	5 29 25.44	2.2356	19 47 26.0	3.746
10	3 48 57.66	2.0420	15 14 0.0	7.604	10	5 31 39.70	2.2397	19 51 7.8	3.645
11	3 51 0.30	2.0459	15 21 34.3	7.540	11	5 33 54.20	2.2437	19 54 43.5	3.543
12	3 53 3.17	2.0498	15 29 4.8	7.475	12	5 36 8.94	2.2478	19 58 13.0	3.441
13	3 55 6.27	2.0537	15 36 31.3	7.409	13	5 38 23.93	2.2518	20 1 36.4	3.339
14	3 57 9.61	2.0575	15 43 53.9	7.343	14	5 40 39.16	2.2559	20 4 53.7	3.235
15	3 59 13.18	2.0613	15 51 12.5	7.276	15	5 42 54.63	2.2599	20 8 4.7	3.131
16	4 1 16.97	2.0652	15 58 27.0	7.207	16	5 45 10.35	2.2639	20 11 9.4	3.026
17	4 3 21.00	2.0691	16 5 37.4	7.138	17	5 47 26.31	2.2679	20 14 7.8	2.921
18	4 5 25.26	2.0731	16 12 43.6	7.068	18	5 49 42.50	2.2719	20 16 59.9	2.815
19	4 7 29.76	2.0771	16 19 45.6	6.998	19	5 51 58.93	2.2758	20 19 45.6	2.708
20	4 9 34.51	2.0811	16 26 43.4	6.927	20	5 54 15.60	2.2797	20 22 24.8	2.600
21	4 11 39.50	2.0852	16 33 36.9	6.855	21	5 56 32.50	2.2835	20 24 57.5	2.492
22	4 13 44.74	2.0893	16 40 26.0	6.782	22	5 58 49.62	2.2874	20 27 23.8	2.383
23	4 15 50.22	2.0934	N.16 47 10.7	6.708	23	6 1 6.98	2.2912	N.20 29 43.5	2.273
SUNDAY 26.					TUESDAY 28.				
0	4 17 55.95	2.0975	N.16 53 51.0	6.634	0	6 3 24.56	2.2950	N.20 31 56.5	2.163
1	4 20 1.92	2.1016	17 0 26.8	6.559	1	6 5 42.37	2.2988	20 34 2.9	2.052
2	4 22 8.14	2.1057	17 6 58.1	6.483	2	6 8 0.41	2.3025	20 36 2.7	1.940
3	4 24 14.60	2.1097	17 13 24.8	6.407	3	6 10 18.67	2.3062	20 37 55.8	1.828
4	4 26 21.31	2.1138	17 19 46.9	6.329	4	6 12 37.15	2.3098	20 39 42.1	1.715
5	4 28 28.26	2.1179	17 26 4.3	6.251	5	6 14 55.84	2.3133	20 41 21.6	1.602
6	4 30 35.46	2.1220	17 32 17.0	6.172	6	6 17 14.75	2.3169	20 42 54.3	1.488
7	4 32 42.91	2.1262	17 38 24.9	6.092	7	6 19 33.87	2.3205	20 44 20.1	1.373
8	4 34 50.61	2.1304	17 44 28.1	6.011	8	6 21 53.21	2.3240	20 45 39.0	1.258
9	4 36 58.57	2.1347	17 50 26.4	5.930	9	6 24 12.76	2.3275	20 46 51.0	1.142
10	4 39 6.78	2.1389	17 56 19.7	5.848	10	6 26 32.51	2.3309	20 47 56.0	1.025
11	4 41 15.25	2.1432	18 2 8.1	5.765	11	6 28 52.47	2.3343	20 48 54.0	0.908
12	4 43 23.97	2.1474	18 7 51.5	5.681	12	6 31 12.63	2.3377	20 49 44.9	0.790
13	4 45 32.94	2.1517	18 13 29.8	5.597	13	6 33 32.99	2.3410	20 50 28.7	0.672
14	4 47 42.17	2.1559	18 19 3.1	5.512	14	6 35 53.55	2.3442	20 51 5.5	0.553
15	4 49 51.65	2.1600	18 24 31.3	5.426	15	6 38 14.30	2.3474	20 51 35.1	0.434
16	4 52 1.37	2.1642	18 29 54.2	5.339	16	6 40 35.24	2.3506	20 51 57.6	0.314
17	4 54 11.35	2.1684	18 35 11.9	5.251	17	6 42 56.37	2.3537	20 52 12.9	0.194
18	4 56 21.58	2.1726	18 40 24.3	5.163	18	6 45 17.69	2.3568	20 52 20.9	0.073
19	4 58 32.07	2.1769	18 45 31.4	5.074	19	6 47 39.19	2.3599	20 52 21.7	0.048
20	5 0 42.81	2.1811	18 50 33.2	4.984	20	6 50 0.88	2.3629	20 52 15.2	0.170
21	5 2 53.81	2.1854	18 55 29.6	4.893	21	6 52 22.74	2.3658	20 52 1.4	0.292
22	5 5 5.06	2.1896	19 0 20.4	4.801	22	6 54 44.78	2.3687	20 51 40.2	0.414
23	5 7 16.56	2.1938	19 5 5.7	4.709	23	6 57 6.99	2.3715	20 51 11.7	0.537
24	5 9 28.32	2.1980	N.19 9 45.5	4.616	24	6 59 29.36	2.3743	N.20 50 35.7	0.660

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 29.					THURSDAY 30.				
0	<sup>h</sup> 6 <sup>m</sup> 59 <sup>s</sup> 29.36	2.3743	N.20° 50' 35.7"	0.660	0	<sup>h</sup> 7 <sup>m</sup> 57 <sup>s</sup> 8.75	2.4250	N.19° 58' 25.5"	3.708
1	7 1 51.90	2.3771	20 49 52.3	0.784	1	7 59 34.29	2.4264	19 54 39.2	3.837
2	7 4 14.61	2.3798	20 49 1.6	0.908	2	8 1 59.92	2.4277	19 50 45.1	3.965
3	7 6 37.48	2.3824	20 48 3.4	1.033	3	8 4 25.62	2.4290	19 46 43.3	4.094
4	7 9 0.50	2.3850	20 46 57.7	1.158	4	8 6 51.40	2.4302	19 42 33.8	4.223
5	7 11 23.68	2.3875	20 45 44.5	1.283	5	8 9 17.25	2.4314	19 38 16.5	4.352
6	7 13 47.00	2.3900	20 44 23.7	1.409	6	8 11 43.17	2.4326	19 33 51.5	4.480
7	7 16 10.47	2.3924	20 42 55.4	1.535	7	8 14 9.15	2.4336	19 29 18.8	4.609
8	7 18 34.09	2.3948	20 41 19.5	1.661	8	8 16 35.20	2.4346	19 24 38.4	4.737
9	7 20 57.85	2.3971	20 39 36.0	1.788	9	8 19 1.30	2.4355	19 19 50.3	4.866
10	7 23 21.74	2.3993	20 37 45.0	1.914	10	8 21 27.46	2.4364	19 14 54.5	4.994
11	7 25 45.77	2.4015	20 35 46.4	2.041	11	8 23 53.67	2.4373	19 9 51.1	5.121
12	7 28 9.92	2.4036	20 33 40.1	2.168	12	8 26 19.93	2.4381	19 4 40.0	5.249
13	7 30 34.20	2.4057	20 31 26.2	2.296	13	8 28 46.23	2.4388	18 59 21.2	5.377
14	7 32 58.61	2.4078	20 29 4.6	2.424	14	8 31 12.58	2.4395	18 53 54.8	5.504
15	7 35 23.14	2.4098	20 26 35.3	2.552	15	8 33 38.97	2.4401	18 48 20.8	5.630
16	7 37 47.79	2.4117	20 23 58.4	2.680	16	8 36 5.39	2.4407	18 42 39.2	5.757
17	7 40 12.55	2.4136	20 21 13.8	2.808	17	8 38 31.85	2.4412	18 36 50.0	5.883
18	7 42 37.42	2.4154	20 18 21.4	2.936	18	8 40 58.33	2.4416	18 30 53.2	6.009
19	7 45 2.39	2.4171	20 15 21.3	3.065	19	8 43 24.84	2.4420	18 24 48.9	6.135
20	7 47 27.47	2.4188	20 12 13.6	3.193	20	8 45 51.37	2.4424	18 18 37.0	6.260
21	7 49 52.65	2.4204	20 8 58.2	3.322	21	8 48 17.92	2.4427	18 12 17.6	6.385
22	7 52 17.92	2.4220	20 5 35.0	3.450	22	8 50 44.49	2.4430	18 5 50.8	6.510
23	7 54 43.29	2.4236	20 2 4.1	3.579	23	8 53 11.08	2.4432	17 59 16.5	6.634
24	7 57 8.75	2.4250	N.19 58 25.5	3.708	24	8 55 37.68	2.4434	N.17 52 34.7	6.757

PHASES OF THE MOON.

● New Moon,	<sup>d</sup> 5 <sup>h</sup> 18 <sup>m</sup> 6.5
☾ First Quarter,	12 9 23.5
○ Full Moon,	20 8 40.9
☾ Last Quarter,	28 9 9.9

☾ Perigee,	<sup>d</sup> 6 <sup>h</sup> 8.4
☾ Apogee,	20 20.2

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	$\alpha$ Arietis W.	60 20 38	2712	61 57 2	2687	63 34 0	2662	65 11 31	2638
	Jupiter W.	44 10 41	2537	45 51 3	2517	47 31 53	2497	49 13 11	2477
	Aldebaran W.	27 10 6	2511	28 51 4	2492	30 32 29	2473	32 14 20	2454
	Sun E.	63 59 39	2838	62 26 1	2819	60 51 58	2799	59 17 29	2779
2	$\alpha$ Arietis W.	73 27 5	2525	75 7 44	2504	76 48 52	2483	78 30 29	2462
	Jupiter W.	57 46 40	2379	59 30 45	2359	61 15 18	2341	63 0 18	2322
	Aldebaran W.	40 50 20	2359	42 34 53	2341	44 19 53	2322	46 5 20	2304
	Sun E.	51 18 28	2680	49 41 21	2661	48 3 49	2642	46 25 51	2624
3	$\alpha$ Arietis W.	87 5 28	2371	88 49 45	2353	90 34 27	2337	92 19 32	2322
	Jupiter W.	71 52 1	2223	73 39 39	2216	75 27 43	2200	77 16 11	2184
	Aldebaran W.	54 59 7	2217	56 47 9	2200	58 35 36	2184	60 24 27	2169
	Sun E.	38 9 46	2535	36 29 21	2519	34 48 34	2503	33 7 25	2489
7	Sun W.	18 13 57	2335	19 59 6	2333	21 44 18	2332	23 29 31	2333
	Antares E.	65 51 47	2056	63 59 40	2022	62 7 43	2070	60 15 58	2079
	Saturn E.	68 20 28	2007	66 27 3	2012	64 33 49	2018	62 40 43	2025
8	Sun W.	32 14 25	2369	33 58 54	2371	35 43 10	2382	37 27 11	2392
	Antares E.	51 1 17	2141	49 11 20	2157	47 21 47	2174	45 32 40	2192
	Saturn E.	53 18 13	2069	51 26 26	2081	49 34 57	2092	47 43 45	2103
	$\alpha$ Aquilæ E.	98 9 39	2623	96 31 15	2628	94 52 58	2636	93 14 52	2646
9	Sun W.	46 3 3	2458	47 45 16	2472	49 27 9	2487	51 8 41	2503
	Saturn E.	38 32 39	2173	36 43 31	2188	34 54 46	2205	33 6 26	2222
	$\alpha$ Aquilæ E.	85 8 16	2715	83 31 56	2735	81 56 2	2754	80 20 34	2775
10	Sun W.	59 30 41	2585	61 9 56	2604	62 48 46	2621	64 27 12	2638
	Venus W.	27 4 1	2718	28 40 17	2739	30 16 15	2745	31 51 55	2758
	Spica W.	26 6 26	2432	27 49 15	2432	29 32 4	2434	31 14 50	2438
	$\alpha$ Aquilæ E.	72 30 46	2903	70 58 31	2934	69 26 55	2965	67 55 59	2996
	Fomalhaut E.	105 41 27	2527	104 0 51	2539	102 20 32	2552	100 40 31	2566
11	Sun W.	72 33 22	2729	74 9 24	2747	75 45 1	2766	77 20 14	2783
	Spica W.	39 46 29	2482	41 28 8	2493	43 9 31	2505	44 50 37	2519
	Venus W.	39 45 33	2835	41 19 15	2852	42 52 36	2869	44 25 35	2886
	Mars W.	27 23 22	2710	28 59 48	2730	30 36 1	2731	32 12 0	2742
	$\alpha$ Aquilæ E.	60 32 26	3196	59 6 12	3242	57 40 52	3290	56 16 29	3343
	Fomalhaut E.	92 25 27	2643	90 47 30	2660	89 9 56	2676	87 32 44	2694
12	$\alpha$ Pegasi E.	107 30 13	2798	105 55 43	2809	104 21 27	2820	102 47 25	2831
	Sun W.	85 10 28	2873	86 43 22	2891	88 15 53	2908	89 48 2	2925
	Spica W.	53 11 27	2587	54 50 40	2601	56 29 34	2615	58 8 8	2629
	Venus W.	52 5 3	2971	53 35 52	2988	55 6 20	3005	56 36 27	3022
	Mars W.	40 7 53	2808	41 42 10	2822	43 16 9	2837	44 49 49	2852
	Fomalhaut E.	79 32 45	2786	77 57 59	2805	76 23 38	2825	74 49 42	2845
13	$\alpha$ Pegasi E.	95 1 17	2899	93 28 57	2913	91 56 55	2929	90 25 13	2945
	Sun W.	97 23 28	3007	98 53 32	3023	100 23 16	3039	101 52 41	3054
	Spica W.	66 16 14	2698	67 52 56	2713	69 29 19	2726	71 5 24	2739
	Venus W.	64 1 55	3 02	65 30 2	3119	66 57 49	3134	68 25 17	3148
	Mars W.	52 33 29	2924	54 5 18	2938	55 36 49	2951	57 8 3	2965
	Fomalhaut E.	67 6 35	2949	65 35 18	2970	64 4 28	2993	62 34 6	3017
13	$\alpha$ Pegasi E.	82 51 45	3027	81 22 6	3046	79 52 50	3064	78 23 56	3082



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	$\alpha$ Arietis W.	66° 49' 35"	2614	68° 28' 11"	2591	70° 7' 18"	2569	71° 46' 56"	2546
	Jupiter W.	50 54 57	2457	52 37 11	2437	54 19 53	2417	56 3 3	2398
	Aldebaran W.	33 56 38	2435	35 39 23	2416	37 22 35	2397	39 6 14	2378
	SUN E.	57 42 33	2759	56 7 11	2739	54 31 23	2719	52 55 9	2699
2	$\alpha$ Arietis W.	80 12 35	2443	81 55 9	2424	83 38 9	2405	85 21 36	2388
	Jupiter W.	64 45 46	2204	66 31 40	2185	68 18 1	2168	70 4 48	2150
	Aldebaran W.	47 51 13	2287	49 37 32	2268	51 24 18	2251	53 11 30	2234
	SUN E.	44 47 28	2604	43 8 39	2587	41 29 26	2569	39 49 48	2551
3	$\alpha$ Arietis W.	94 4 59	2308	95 50 47	2294	97 36 55	2281	99 23 22	2270
	Jupiter W.	79 5 3	2169	80 54 18	2153	82 43 56	2139	84 33 56	2125
	Aldebaran W.	62 13 41	2154	64 3 18	2139	65 53 18	2124	67 43 40	2111
	SUN E.	31 25 56	2475	29 44 7	2462	28 2 0	2450	26 19 36	2438
7	SUN W.	25 14 43	2336	26 59 50	2340	28 44 51	2346	30 29 43	2353
	Antares E.	58 24 27	2090	56 33 12	2101	54 42 14	2113	52 51 35	2127
	Saturn E.	60 47 48	2032	58 55 4	2041	57 2 33	2050	55 10 16	2059
8	SUN W.	39 10 57	2404	40 54 26	2417	42 37 37	2429	44 20 30	2443
	Antares E.	43 44 0	2212	41 55 50	2233	40 8 11	2256	38 21 6	2281
	Saturn E.	45 52 51	2116	44 2 17	2130	42 12 3	2143	40 22 10	2158
	$\alpha$ Aquilæ E.	91 36 59	2657	89 59 21	2669	88 22 0	2689	86 44 58	2696
9	SUN W.	52 49 50	2519	54 30 37	2535	56 11 1	2552	57 51 2	2568
	Saturn E.	31 18 31	2239	29 31 2	2258	27 44 0	2276	25 57 25	2295
	$\alpha$ Aquilæ E.	78 45 33	2798	77 11 2	2809	75 37 3	2848	74 3 37	2875
10	SUN W.	66 5 15	2657	67 42 53	2675	69 20 7	2693	70 56 56	2710
	Venus W.	33 27 18	2772	35 2 22	2788	36 37 6	2803	38 11 30	2819
	Spica W.	32 57 31	2443	34 40 4	2452	36 22 25	2460	38 4 34	2470
	$\alpha$ Aquilæ E.	66 25 44	2034	64 56 13	2072	63 27 29	2111	61 59 33	2152
	Fomalhaut E.	99 0 49	2580	97 21 27	2596	95 42 26	2611	94 3 46	2626
11	SUN W.	78 55 4	2801	80 29 30	2820	82 3 32	2838	83 37 11	2855
	Spica W.	46 31 24	2532	48 11 53	2545	49 52 3	2559	51 31 54	2572
	Venus W.	45 58 12	2903	47 30 27	2920	49 2 21	2937	50 33 53	2954
	Mars W.	33 47 44	2754	35 23 12	2766	36 58 24	2780	38 33 18	2795
	$\alpha$ Aquilæ E.	54 53 7	2398	53 30 48	2455	52 9 34	2517	50 49 29	2587
	Fomalhaut E.	85 55 56	2712	84 19 32	2730	82 43 32	2748	81 7 56	2767
	$\alpha$ Pegasi E.	101 13 38	2844	99 40 7	2857	98 6 53	2870	96 33 56	2884
12	SUN W.	91 19 49	2942	92 51 15	2958	94 22 20	2975	95 53 4	2991
	Spica W.	59 46 23	2643	61 24 19	2657	63 1 56	2672	64 39 14	2685
	Venus W.	58 6 13	3038	59 35 39	3055	61 4 44	3071	62 33 29	3087
	Mars W.	46 23 10	2866	47 56 12	2880	49 28 56	2894	51 1 22	2909
	Fomalhaut E.	73 16 12	2865	71 43 8	2885	70 10 30	2906	68 38 19	2927
	$\alpha$ Pegasi E.	88 53 51	2961	87 22 49	2977	85 52 7	2993	84 21 46	3009
13	SUN W.	103 21 47	3069	104 50 35	3084	106 19 4	3098	107 47 16	3112
	Spica W.	72 41 12	2753	74 16 42	2765	75 51 56	2778	77 26 53	2790
	Venus W.	69 52 28	3163	71 19 21	3178	72 45 56	3198	74 12 14	3207
	Mars W.	58 38 59	2979	60 9 38	2993	61 40 0	3005	63 10 6	3018
	Fomalhaut E.	61 4 14	3040	59 34 51	3064	58 5 57	3089	56 37 34	3114
	$\alpha$ Pegasi E.	76 55 24	3101	75 27 15	3119	73 59 28	3132	72 32 5	3158

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
14	Sun W.	109° 15' 11"	3198	110° 42' 49"	3140	112° 10' 10"	3153	113° 37' 15"	3166
	Spica W.	79 1 34	2803	80 35 59	2815	82 10 8	2826	83 44 2	2838
	Venus W.	75 38 15	3220	77 4 0	3234	78 29 29	3247	79 54 43	3260
	Mars W.	64 39 56	3031	66 9 30	3044	67 38 48	3056	69 7 51	3068
	Antares W.	33 40 33	2940	35 12 1	2939	36 43 30	2940	38 14 58	2942
	Saturn W.	29 38 45	2806	31 13 5	2817	32 47 11	2827	34 21 4	2838
	Fomalhaut E.	55 9 42	3142	53 42 23	3169	52 15 37	3198	50 49 25	3229
	α Pegasi E.	71 5 6	3179	69 38 32	3199	68 12 22	3220	66 46 37	3243
15	Spica W.	91 29 56	2901	93 2 26	2901	94 34 43	2911	96 6 48	2921
	Venus W.	86 57 10	3320	88 20 58	3331	89 44 34	3342	91 7 57	3352
	Mars W.	76 29 34	3124	77 57 14	3134	79 24 42	3145	80 51 57	3154
	Antares W.	45 51 24	2961	47 22 26	2966	48 53 21	2971	50 24 10	2977
	Saturn W.	42 7 8	2887	43 39 43	2898	45 12 5	2906	46 44 16	2915
	Fomalhaut E.	43 48 4	3408	42 25 57	3453	41 4 40	3499	39 44 15	3550
	α Pegasi E.	59 44 38	3364	58 21 40	3391	56 59 13	3419	55 37 18	3449
	α Arietis E.	101 57 51	3018	100 28 1	3026	98 58 21	3034	97 28 51	3043
16	Venus W.	98 1 57	3401	99 24 12	3409	100 46 18	3418	102 8 14	3426
	Mars W.	88 5 24	3199	89 31 34	3208	90 57 34	3216	92 23 24	3224
	Antares W.	57 56 33	3004	59 26 41	3009	60 56 42	3014	62 26 37	3020
	Saturn W.	54 22 26	2957	55 53 33	2964	57 24 31	2972	58 55 19	2978
	α Pegasi E.	48 56 41	3225	47 38 34	3227	46 21 12	3219	45 4 38	3213
	α Arietis E.	90 3 53	3083	88 35 23	3091	87 7 2	3099	85 38 51	3107
	Jupiter E.	105 10 8	2932	103 38 30	2939	102 7 1	2946	100 35 41	2954
17	Mars W.	99 30 24	3259	100 55 24	3265	102 20 17	3271	103 45 2	3277
	Antares W.	69 54 35	3044	71 23 53	3050	72 53 4	3054	74 22 10	3059
	Saturn W.	66 27 15	3010	67 57 15	3016	69 27 8	3022	70 56 54	3026
	α Arietis E.	78 20 19	3145	76 53 4	3153	75 25 58	3161	73 59 2	3168
	Jupiter E.	93 1 7	2985	91 30 35	2990	90 0 10	2995	88 29 51	3001
18	Antares W.	81 46 20	3079	83 14 55	3082	84 43 27	3085	86 11 55	3089
	Saturn W.	78 24 13	3050	79 53 24	3054	81 22 30	3058	82 51 31	3061
	α Aquilæ W.	42 24 48	4498	43 28 42	4492	44 33 43	4533	45 39 47	4590
	α Arietis E.	66 46 42	3209	65 20 43	3216	63 54 53	3225	62 29 14	3234
	Jupiter E.	80 59 49	3023	79 30 5	3027	78 0 26	3030	76 30 51	3034
	Aldebaran E.	97 53 25	3026	96 23 44	3029	94 54 7	3033	93 24 35	3037
19	Antares W.	93 33 11	3105	95 1 15	3107	96 29 16	3110	97 57 14	3112
	Saturn W.	90 15 36	3077	91 44 14	3079	93 12 49	3082	94 41 21	3084
	α Aquilæ W.	51 23 9	4049	52 34 0	4015	53 45 25	3980	54 57 24	3948
	α Arietis E.	55 23 42	3284	53 59 12	3295	52 34 55	3307	51 10 52	3319
	Jupiter E.	69 4 0	3050	67 34 49	3052	66 5 40	3054	64 36 34	3056
	Aldebaran E.	85 57 59	3052	84 28 51	3055	82 59 46	3057	81 30 44	3059
20	α Aquilæ W.	61 4 23	2927	62 18 57	2927	63 33 52	2930	64 49 5	2933
	α Arietis E.	44 14 39	3400	42 52 22	3420	41 30 28	3442	40 8 59	3465
	Jupiter E.	57 11 45	3066	55 42 54	3068	54 14 5	3069	52 45 17	3070
	Aldebaran E.	74 6 7	3068	72 37 18	3069	71 8 30	3069	69 39 43	3070
21	α Aquilæ W.	71 9 4	2708	72 25 43	2697	73 42 33	2687	74 59 34	2678
	Fomalhaut W.	36 30 51	3206	37 45 47	3256	39 1 35	3213	40 18 8	3276
	Jupiter E.	45 21 37	3074	43 52 56	3074	42 24 15	3075	40 55 35	3077
	Aldebaran E.	62 16 0	3072	60 47 16	3072	59 18 32	3072	57 49 48	3071

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of D. ff.
14	Sun W.	115° 4' 5"	3179	116° 30' 39"	3192	117° 56' 58"	3204	119° 23' 3"	3215
	Spica W.	85 17 41	2848	86 51 6	2860	88 24 16	2870	89 57 13	2881
	Venus W.	81 19 41	3372	82 44 25	3285	84 8 54	3297	85 33 9	3309
	Mars W.	70 36 40	3089	72 5 14	3091	73 33 34	3102	75 1 41	3114
	Antares W.	39 46 23	2945	41 17 45	2948	42 49 3	2952	44 20 16	2956
	Saturn W.	35 54 43	2848	37 28 8	2858	39 1 21	2868	40 34 21	2878
	Fomalhaut E.	49 23 50	3261	47 58 53	3294	46 34 34	3330	45 10 57	3368
	α Pegasi E.	65 21 19	3265	63 56 27	3288	62 32 2	3313	61 8 5	3338
15	Spica W.	97 38 40	2930	99 10 21	2939	100 41 50	2948	102 13 8	2958
	Venus W.	92 31 8	3363	93 54 7	3372	95 16 55	3382	96 39 32	3393
	Mars W.	82 19 1	3164	83 45 53	3173	85 12 34	3183	86 39 4	3191
	Antares W.	51 54 52	2982	53 25 27	2987	54 55 56	2993	56 26 18	2998
	Saturn W.	48 16 16	2924	49 48 5	2933	51 19 42	2941	52 51 9	2949
	Fomalhaut E.	38 24 46	3006	37 6 18	3068	35 48 57	3736	34 32 48	3811
	α Pegasi E.	54 15 57	3480	52 55 11	3514	51 35 2	3548	50 15 31	3586
	α Arietis E.	95 59 31	3051	94 30 21	3060	93 1 22	3068	91 32 33	3075
16	Venus W.	103 30 1	3434	104 51 39	3442	106 13 8	3450	107 34 28	3458
	Mars W.	93 49 5	3231	95 14 37	3238	96 40 1	3245	98 5 17	3253
	Antares W.	63 56 25	3025	65 26 7	3030	66 55 42	3035	68 25 11	3039
	Saturn W.	60 25 59	2985	61 56 30	2992	63 26 53	2998	64 57 8	3005
	α Pegasi E.	43 48 57	3816	42 34 11	3872	41 20 23	3935	40 7 39	4006
	α Arietis E.	84 10 50	3114	82 42 58	3123	81 15 16	3130	79 47 43	3138
	Jupiter E.	99 4 30	2961	97 33 28	2966	96 2 33	2973	94 31 46	2979
17	Mars W.	105 9 40	3283	106 34 11	3288	107 58 36	3294	109 22 55	3298
	Antares W.	75 51 10	3063	77 20 5	3067	78 48 55	3071	80 17 40	3075
	Saturn W.	72 26 34	3032	73 56 7	3036	75 25 35	3041	76 54 57	3046
	α Arietis E.	72 32 15	3176	71 5 37	3184	69 39 9	3193	68 12 51	3200
	Jupiter E.	86 59 39	3005	85 29 33	3010	83 59 33	3014	82 29 38	3019
18	Antares W.	87 40 18	3092	89 8 37	3096	90 36 52	3099	92 5 3	3101
	Saturn W.	84 20 28	3065	85 49 21	3068	87 18 10	3071	88 46 55	3074
	α Aquilæ W.	46 46 49	4233	47 54 44	4181	49 3 28	4134	50 12 57	4089
	α Arietis E.	61 3 45	3243	59 38 27	3253	58 13 20	3263	56 48 25	3273
	Jupiter E.	75 1 21	3038	73 31 55	3041	72 2 33	3044	70 33 15	3047
	Aldebaran E.	91 55 8	3040	90 25 45	3043	88 56 26	3047	87 27 11	3049
19	Antares W.	99 25 9	3114	100 53 1	3117	102 20 50	3119	103 48 36	3121
	Saturn W.	96 9 50	3088	97 38 17	3088	99 6 41	3090	100 35 3	3091
	α Aquilæ W.	56 9 55	3919	57 22 55	3895	58 36 20	3870	59 50 10	3848
	α Arietis E.	49 47 3	3333	48 23 30	3349	47 0 15	3364	45 37 17	3381
	Jupiter E.	63 7 31	3059	61 38 31	3060	60 9 33	3063	58 40 38	3065
	Aldebaran E.	80 1 44	3060	78 32 46	3063	77 3 51	3065	75 34 58	3066
20	α Aquilæ W.	66 4 35	3758	67 20 21	3744	68 36 22	3730	69 52 37	3719
	α Arietis E.	38 47 57	3493	37 27 25	3524	36 7 27	3557	34 48 6	3594
	Jupiter E.	51 16 31	3071	49 47 46	3072	48 19 2	3073	46 50 19	3073
	Aldebaran E.	68 10 57	3071	66 42 12	3072	65 13 28	3072	63 44 44	3072
21	α Aquilæ W.	76 16 44	3670	77 34 3	3663	78 51 30	3655	80 9 5	3649
	Fomalhaut W.	41 35 21	3640	42 53 12	3608	44 11 38	3579	45 30 35	3552
	Jupiter E.	39 26 57	3077	37 58 19	3077	36 29 41	3078	35 1 4	3078
	Aldebaran E.	56 21 3	3070	54 52 17	3070	53 23 31	3069	51 54 43	3067

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
21	Pollux E.	106° 19' 43"	3117	104° 51' 54"	3115	103° 24' 3"	3114	101° 56' 11"	3114
22	α Aquilæ W.	81 26 47	3643	82 44 35	3637	84 2 29	3633	85 20 28	3628
	Fomalhaut W.	46 50 2	3527	48 9 56	3505	49 30 15	3483	50 50 58	3464
	Jupiter E.	33 32 28	3079	32 3 53	3079	30 35 18	3080	29 6 44	3088
	Aldebaran E.	50 25 53	3065	48 57 1	3065	47 28 8	3063	45 59 13	3060
	Pollux E.	94 36 31	3107	93 8 30	3105	91 40 26	3103	90 12 20	3101
23	α Aquilæ W.	91 51 25	3613	93 9 45	3611	94 28 7	3610	95 46 31	3610
	Fomalhaut W.	57 39 33	3383	59 2 9	3369	60 25 1	3355	61 48 9	3343
	α Pegasi W.	44 18 49	3838	45 33 12	3795	46 48 19	3756	48 4 7	3718
	Aldebaran E.	38 33 54	3047	37 4 40	3044	35 35 22	3041	34 6 0	3038
	Pollux E.	82 51 7	3088	81 22 43	3085	79 54 15	3082	78 25 43	3078
24	Fomalhaut W.	68 47 16	3285	70 11 45	3275	71 36 26	3264	73 1 20	3254
	α Pegasi W.	54 32 5	3569	55 51 13	3544	57 10 49	3520	58 30 51	3498
	Pollux E.	71 1 54	3058	69 32 53	3054	68 3 47	3049	66 34 35	3044
	Regulus E.	106 45 43	3013	105 15 46	3007	103 45 42	3001	102 15 31	2995
25	Fomalhaut W.	80 8 44	3204	81 34 48	3194	83 1 4	3184	84 27 32	3175
	α Pegasi W.	65 16 54	3399	66 39 12	3381	68 1 50	3364	69 24 48	3346
	Pollux E.	59 6 59	3017	57 37 7	3010	56 7 7	3005	54 37 0	2999
	Regulus E.	94 42 34	2961	93 11 32	2953	91 40 20	2944	90 8 57	2936
26	Fomalhaut W.	91 42 46	3126	93 10 24	3116	94 38 14	3106	96 6 16	3096
	α Pegasi W.	76 24 20	3269	77 49 8	3253	79 14 14	3239	80 39 37	3224
	α Arietis W.	32 55 48	3427	34 17 34	3376	35 40 18	3329	37 3 56	3285
	Pollux E.	47 4 31	2968	45 33 38	2961	44 2 36	2955	42 31 27	2950
	Regulus E.	82 29 16	2989	80 56 43	2978	79 23 56	2968	77 50 56	2956
	SUN E.	117 44 33	3263	116 19 38	3251	114 54 29	3239	113 29 6	3226
27	α Pegasi W.	87 50 46	3155	89 17 49	3142	90 45 8	3129	92 12 43	3116
	α Arietis W.	44 13 41	3110	45 41 39	3080	47 10 13	3059	48 39 22	3024
	Jupiter W.	27 39 28	2912	29 13 40	2790	30 48 13	2779	32 23 8	2763
	Pollux E.	34 54 6	2929	33 22 24	2927	31 50 39	2927	30 18 55	2931
	Regulus E.	70 2 9	2796	68 27 36	2789	66 52 45	2769	65 17 37	2756
	SUN E.	106 18 24	3160	104 51 27	3146	103 24 13	3132	101 56 42	3116
28	α Arietis W.	56 13 16	2989	57 45 36	2976	59 18 25	2954	60 51 43	2931
	Jupiter W.	40 23 11	2980	42 0 18	2963	43 37 47	2946	45 15 39	2929
	Aldebaran W.	22 54 39	2986	24 31 38	2970	26 8 58	2954	27 46 40	2937
	Regulus E.	57 17 17	2982	55 40 13	2967	54 2 49	2952	52 25 4	2935
	SUN E.	94 34 22	3037	93 4 55	3021	91 35 8	3003	90 4 59	2996
29	α Arietis W.	68 45 25	2723	70 21 34	2702	71 58 11	2682	73 35 15	2661
	Jupiter W.	53 30 54	2542	55 11 9	2524	56 51 49	2506	58 32 54	2488
	Aldebaran W.	36 0 53	2552	37 40 54	2535	39 21 19	2517	41 2 8	2499
	Regulus E.	44 10 48	2553	42 30 48	2535	40 50 24	2518	39 9 36	2502
	SUN E.	82 28 44	2996	80 56 20	2978	79 23 33	2959	77 50 22	2942
30	α Arietis W.	81 47 24	2563	83 27 10	2544	85 7 22	2525	86 48 0	2507
	Jupiter W.	67 4 41	2397	68 48 20	2379	70 32 25	2361	72 16 56	2343
	Aldebaran W.	49 32 28	2410	51 15 48	2392	52 59 34	2374	54 43 46	2356
	Regulus E.	30 39 35	2415	28 56 21	2397	27 12 42	2380	25 28 38	2364
	SUN E.	69 58 25	2747	68 22 47	2728	66 46 44	2709	65 10 16	2690

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
21	Pollux	E.	100° 28' 18"	3113	99° 0' 24"	3111	97° 32' 28"	3110	96° 4' 30"	3109
22	$\alpha$ Aquilæ	W.	86 38 32	3624	87 56 40	3621	89 14 52	3618	90 33 7	3615
	Fomalhaut	W.	52 12 2	3446	53 33 27	3429	54 55 11	3413	56 17 13	3397
	Jupiter	E.	27 38 12	3083	26 9 42	3086	24 41 15	3089	23 12 52	3092
	Aldebaran	E.	44 30 15	3059	43 1 15	3056	41 32 11	3053	40 3 4	3051
	Pollux	E.	88 44 11	3098	87 15 59	3096	85 47 45	3094	84 19 28	3091
23	$\alpha$ Aquilæ	W.	97 4 55	3609	98 23 20	3610	99 41 44	3610	101 0 8	3610
	Fomalhaut	W.	63 11 31	3331	64 35 7	3319	65 58 57	3307	67 23 0	3296
	$\alpha$ Pegasi	W.	49 20 35	3684	50 37 39	3653	51 55 16	3623	53 13 25	3596
	Aldebaran	E.	32 36 34	3034	31 7 3	3029	29 37 26	3025	28 7 44	3021
	Pollux	E.	76 57 6	3074	75 28 25	3071	73 59 40	3067	72 30 50	3062
24	Fomalhaut	W.	74 26 25	3944	75 51 42	3924	77 17 11	3894	78 42 52	3914
	$\alpha$ Pegasi	W.	59 51 17	3477	61 12 7	3455	62 33 21	3436	63 54 57	3417
	Pollux	E.	65 5 17	3039	63 35 53	3034	62 6 22	3028	60 36 44	3022
	Regulus	E.	100 45 12	2969	99 14 45	2962	97 44 10	2976	96 13 27	2968
25	Fomalhaut	W.	85 54 11	3165	87 21 2	3155	88 48 5	3145	90 15 20	3136
	$\alpha$ Pegasi	W.	70 48 6	3331	72 11 42	3314	73 35 37	3299	74 59 50	3284
	Pollux	E.	53 6 46	2993	51 36 24	2986	50 5 54	2980	48 35 16	2974
	Regulus	E.	88 37 24	2927	87 5 40	2918	85 33 44	2909	84 1 36	2899
26	Fomalhaut	W.	97 34 30	3087	99 2 56	3078	100 31 33	3068	102 0 22	3058
	$\alpha$ Pegasi	W.	82 5 18	3210	83 31 15	3196	84 57 29	3183	86 23 59	3168
	$\alpha$ Arietis	W.	38 28 25	2945	39 53 41	2909	41 19 40	3173	42 46 21	3141
	Pollux	E.	41 0 11	2945	39 28 49	2939	37 57 20	2935	36 25 45	2931
	Regulus	E.	76 17 41	2845	74 44 11	2833	73 10 26	2821	71 36 25	2809
	Sun	E.	112 3 28	2914	110 37 36	2901	109 11 28	3188	107 45 4	3174
27	$\alpha$ Pegasi	W.	93 40 33	3103	95 8 39	3090	96 37 1	3078	98 5 38	3066
	$\alpha$ Arietis	W.	50 9 5	2997	51 39 21	2973	53 10 8	2948	54 41 26	2923
	Jupiter	W.	33 58 25	2746	35 34 4	2730	37 10 4	2713	38 46 26	2696
	Pollux	E.	28 47 15	2935	27 15 41	2943	25 44 17	2954	24 13 7	2970
	Regulus	E.	63 42 11	2741	62 6 26	2728	60 30 23	2713	58 54 0	2698
	Sun	E.	100 28 52	3101	99 0 43	3086	97 32 16	3069	96 3 29	3053
28	$\alpha$ Arietis	W.	62 25 31	2809	63 59 47	2788	65 34 31	2766	67 9 44	2744
	Jupiter	W.	46 53 55	2612	48 32 34	2594	50 11 37	2577	51 51 4	2560
	Aldebaran	W.	29 24 45	2690	31 3 13	2604	32 42 3	2587	34 21 16	2569
	Regulus	E.	50 46 57	2619	49 8 28	2603	47 29 38	2586	45 50 25	2569
	Sun	E.	88 34 29	2969	87 3 37	2950	85 32 22	2932	84 0 44	2915
29	$\alpha$ Arietis	W.	75 12 47	2641	76 50 46	2621	78 29 12	2601	80 8 5	2588
	Jupiter	W.	60 14 24	2470	61 56 20	2452	63 38 41	2433	65 21 28	2415
	Aldebaran	W.	42 43 22	2489	44 25 1	2465	46 7 4	2446	47 49 33	2428
	Regulus	E.	37 28 25	2484	35 46 49	2467	34 4 49	2449	32 22 24	2432
	Sun	E.	76 16 48	2822	74 42 49	2804	73 8 26	2785	71 33 38	2766
30	$\alpha$ Arietis	W.	88 29 4	2489	90 10 33	2471	91 52 27	2454	93 34 45	2436
	Jupiter	W.	74 1 53	2325	75 47 16	2307	77 33 6	2289	79 19 21	2272
	Aldebaran	W.	56 28 24	2338	58 13 28	2321	59 58 57	2303	61 44 52	2285
	Regulus	E.	23 44 11	2347	21 59 20	2331	20 14 5	2315	18 28 27	2300
	Sun	E.	63 33 23	2672	61 56 5	2654	60 18 23	2635	58 40 16	2617

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be subtracted from Apparent Time.	Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.			
Frid.	1	<sup>h</sup> 12 <sup>m</sup> 30 <sup>s</sup> 34.49	9.065	S. 3° 18' 10.1"	58.28	16' 1.60	64.37	<sup>m</sup> 10 <sup>s</sup> 25.10	0.791
Sat.	2	12 34 12.18	9.079	3 41 27.3	58.19	16 1.87	64.42	10 43.91	0.777
Sun.	3	12 37 50.20	9.093	4 4 42.2	58.08	16 2.15	64.47	11 2.39	0.763
Mon.	4	12 41 28.56	9.108	4 27 54.3	57.95	16 2.42	64.52	11 20.53	0.748
Tues.	5	12 45 7.28	9.123	4 51 3.3	57.81	16 2.70	64.57	11 38.32	0.733
Wed.	6	12 48 46.37	9.139	5 14 8.6	57.65	16 2.98	64.63	11 55.73	0.717
Thur.	7	12 52 25.86	9.156	5 37 9.9	57.48	16 3.26	64.69	12 12.74	0.700
Frid.	8	12 56 5.76	9.174	6 0 6.9	57.29	16 3.54	64.75	12 29.34	0.682
Sat.	9	12 59 46.10	9.192	6 22 59.1	57.08	16 3.82	64.82	12 45.51	0.664
Sun.	10	13 3 26.87	9.211	6 45 46.2	56.86	16 4.10	64.89	13 1.25	0.645
Mon.	11	13 7 8.10	9.230	7 8 27.8	56.62	16 4.38	64.96	13 16.53	0.626
Tues.	12	13 10 49.81	9.250	7 31 3.5	56.37	16 4.67	65.03	13 31.32	0.606
Wed.	13	13 14 32.02	9.271	7 53 32.9	56.10	16 4.95	65.11	13 45.63	0.585
Thur.	14	13 18 14.73	9.293	8 15 55.8	55.81	16 5.23	65.19	13 59.44	0.563
Frid.	15	13 21 57.97	9.315	8 38 11.6	55.51	16 5.51	65.27	14 12.72	0.541
Sat.	16	13 25 41.77	9.338	9 0 19.9	55.19	16 5.79	65.35	14 25.45	0.518
Sun.	17	13 29 26.14	9.362	9 22 20.4	54.85	16 6.06	65.44	14 37.59	0.494
Mon.	18	13 33 11.11	9.386	9 44 12.7	54.50	16 6.34	65.53	14 49.14	0.470
Tues.	19	13 36 56.68	9.412	10 5 56.5	54.14	16 6.61	65.62	15 0.08	0.444
Wed.	20	13 40 42.89	9.439	10 27 31.3	53.76	16 6.88	65.71	15 10.41	0.417
Thur.	21	13 44 29.75	9.467	10 48 56.7	53.36	16 7.15	65.81	15 20.08	0.389
Frid.	22	13 48 17.28	9.496	11 10 12.5	52.95	16 7.42	65.91	15 29.07	0.360
Sat.	23	13 52 5.50	9.525	11 31 18.2	52.52	16 7.68	66.01	15 37.38	0.331
Sun.	24	13 55 54.42	9.555	11 52 13.7	52.08	16 7.94	66.11	15 45.00	0.301
Mon.	25	13 59 44.06	9.585	12 12 58.3	51.62	16 8.19	66.22	15 51.89	0.271
Tues.	26	14 3 34.45	9.616	12 33 31.7	51.15	16 8.45	66.32	15 58.04	0.240
Wed.	27	14 7 25.59	9.648	12 53 53.6	50.66	16 8.70	66.43	16 3.44	0.208
Thur.	28	14 11 17.50	9.680	13 14 3.4	50.15	16 8.95	66.54	16 8.07	0.176
Frid.	29	14 15 10.20	9.713	13 34 0.9	49.63	16 9.20	66.65	16 11.92	0.143
Sat.	30	14 19 3.69	9.746	13 53 45.7	49.09	16 9.45	66.76	16 14.97	0.110
Sun.	31	14 22 57.98	9.780	14 13 17.2	48.53	16 9.69	66.87	16 17.23	0.076
Mon.	32	14 26 53.08	9.813	S. 14 32 35.1	47.95	16 9.94	66.98	16 18.68	0.043

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0.18 from the Sidereal Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be added to Mean Time.	Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.			
Frid.	1	<sup>h</sup> 12 <sup>m</sup> 30 <sup>s</sup> 36.06	9.065	S. 3° 18' 20.3"	58.28	<sup>m</sup> 10 <sup>s</sup> 25.24	0.791	<sup>h</sup> 12 <sup>m</sup> 41 <sup>s</sup> 1.30
Sat.	2	12 34 13.80	9.079	3 41 37.7	58.19	10 44.05	0.777	12 44 57.85
Sun.	3	12 37 51.87	9.093	4 4 52.9	58.08	11 2.53	0.763	12 48 54.40
Mon.	4	12 41 30.28	9.108	4 28 5.3	57.95	11 20.67	0.748	12 52 50.95
Tues.	5	12 45 9.05	9.123	4 51 14.5	57.81	11 38.46	0.733	12 56 47.51
Wed.	6	12 48 48.19	9.139	5 14 20.0	57.65	11 55.87	0.717	13 0 44.06
Thur.	7	12 52 27.73	9.156	5 37 21.6	57.48	12 12.88	0.700	13 4 40.61
Frid.	8	12 56 7.68	9.174	6 0 18.8	57.29	12 29.48	0.682	13 8 37.16
Sat.	9	12 59 48.06	9.192	6 23 11.3	57.08	12 45.65	0.664	13 12 33.71
Sun.	10	13 3 28.87	9.211	6 45 58.6	56.86	13 1.40	0.645	13 16 30.27
Mon.	11	13 7 10.15	9.230	7 8 40.3	56.62	13 16.67	0.626	13 20 26.82
Tues.	12	13 10 51.91	9.250	7 31 16.2	56.37	13 31.46	0.606	13 24 23.37
Wed.	13	13 14 34.15	9.271	7 53 45.8	56.10	13 45.77	0.585	13 28 19.92
Thur.	14	13 18 16.90	9.293	8 16 8.8	55.81	13 59.58	0.563	13 32 16.48
Frid.	15	13 22 0.18	9.315	8 38 24.7	55.51	14 12.85	0.541	13 36 13.03
Sat.	16	13 25 44.02	9.338	9 0 33.1	55.19	14 25.56	0.518	13 40 9.58
Sun.	17	13 29 28.43	9.362	9 22 33.7	54.85	14 37.71	0.494	13 44 6.14
Mon.	18	13 33 13.43	9.386	9 44 26.1	54.50	14 49.26	0.470	13 48 2.69
Tues.	19	13 36 59.04	9.412	10 6 10.0	54.14	15 0.20	0.444	13 51 59.24
Wed.	20	13 40 45.28	9.439	10 27 44.9	53.76	15 10.52	0.417	13 55 55.80
Thur.	21	13 44 32.17	9.467	10 49 10.4	53.36	15 20.18	0.389	13 59 52.35
Frid.	22	13 48 19.73	9.496	11 10 26.2	52.95	15 29.17	0.360	14 3 48.90
Sat.	23	13 52 7.98	9.525	11 31 31.9	52.52	15 37.47	0.331	14 7 45.45
Sun.	24	13 55 56.93	9.555	11 52 27.3	52.08	15 45.08	0.301	14 11 42.01
Mon.	25	13 59 46.60	9.585	12 13 11.9	51.62	15 51.96	0.271	14 15 38.56
Tues.	26	14 3 37.01	9.616	12 33 45.3	51.15	15 58.11	0.240	14 19 35.12
Wed.	27	14 7 28.17	9.648	12 54 7.1	50.66	16 3.50	0.208	14 23 31.67
Thur.	28	14 11 20.10	9.680	13 14 16.9	50.15	16 8.12	0.176	14 27 28.22
Frid.	29	14 15 12.82	9.713	13 34 14.3	49.63	16 11.96	0.143	14 31 24.78
Sat.	30	14 19 6.33	9.746	13 53 59.0	49.09	16 15.00	0.110	14 35 21.33
Sun.	31	14 23 0.64	9.780	14 13 30.4	48.53	16 17.25	0.076	14 39 17.89
Mon.	32	14 26 55.75	9.813	S. 14 32 48.2	47.95	16 18.69	0.043	14 43 14.44

NOTE.— The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+ 9<sup>s</sup>.8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S					Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	274	188° 20' 8.0	19' 45.1	147.74	+0.20	0.0001818	51.2	11 <sup>h</sup> 17 <sup>m</sup> 7.48	
2	275	189 19 14.9	18 51.9	147.84	0.31	0.0000585	51.4	11 13 11.57	
3	276	190 18 24.1	18 1.0	147.93	0.41	9.9999348	51.7	11 9 15.66	
4	277	191 17 35.6	17 12.3	148.02	0.50	.9998104	52.0	11 5 19.75	
5	278	192 16 49.0	16 25.7	148.10	0.56	.9996854	52.2	11 1 23.84	
6	279	193 16 4.5	15 41.2	148.19	0.59	.9995599	52.4	10 57 27.94	
7	280	194 15 22.1	14 58.7	148.27	0.59	.9994339	52.6	10 53 32.04	
8	281	195 14 41.6	14 18.2	148.35	0.56	.9993074	52.8	10 49 36.13	
9	282	196 14 3.0	13 39.5	148.43	0.51	.9991805	52.9	10 45 40.23	
10	283	197 13 26.2	13 2.6	148.51	0.43	.9990534	53.0	10 41 44.32	
11	284	198 12 51.3	12 27.6	148.58	0.32	.9989261	53.1	10 37 48.41	
12	285	199 12 18.1	11 54.3	148.66	0.19	.9987988	53.0	10 33 52.51	
13	286	200 11 46.7	11 22.8	148.73	+0.06	.9986717	52.9	10 29 56.60	
14	287	201 11 17.0	10 53.0	148.81	-0.07	.9985450	52.7	10 26 0.69	
15	288	202 10 49.1	10 25.0	148.88	0.20	.9984189	52.4	10 22 4.78	
16	289	203 10 23.0	9 58.8	148.96	0.33	.9982936	52.1	10 18 8.87	
17	290	204 9 58.7	9 34.4	149.03	0.43	.9981691	51.7	10 14 12.96	
18	291	205 9 36.2	9 11.8	149.11	0.51	.9980456	51.3	10 10 17.05	
19	292	206 9 15.6	8 51.1	149.18	0.57	.9979231	50.9	10 6 21.15	
20	293	207 8 57.0	8 32.4	149.26	0.59	.9978017	50.4	10 2 25.25	
21	294	208 8 40.4	8 15.7	149.35	0.58	.9976816	49.8	9 58 29.34	
22	295	209 8 25.7	8 0.9	149.43	0.54	.9975626	49.3	9 54 33.43	
23	296	210 8 13.1	7 48.2	149.52	0.48	.9974448	48.8	9 50 37.52	
24	297	211 8 2.7	7 37.7	149.61	0.40	.9973283	48.3	9 46 41.61	
25	298	212 7 54.4	7 29.3	149.70	0.30	.9972129	47.8	9 42 45.70	
26	299	213 7 48.4	7 23.2	149.79	0.17	.9970986	47.4	9 38 49.79	
27	300	214 7 44.6	7 19.3	149.89	-0.04	.9969853	47.0	9 34 53.89	
28	301	215 7 43.0	7 17.6	149.98	+0.09	.9968728	46.6	9 30 57.98	
29	302	216 7 43.6	7 18.1	150.07	0.22	.9967612	46.3	9 27 2.07	
30	303	217 7 46.3	7 20.7	150.16	0.33	.9966504	46.0	9 23 6.16	
31	304	218 7 51.1	7 25.4	150.24	0.42	.9965402	45.8	9 19 10.26	
32	305	219 7 58.0	7 32.2	150.33	+0.48	9.9964305	45.5	9 15 14.35	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>s</sup> .830	



## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.

## SEMI- DIAMETER.

## HORIZONTAL PARALLAX.

## MERIDIAN PASSAGE.

## AGE.

	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
1	16' 12.3	16' 19.4	59' 21.6	+2.24	59' 47.8	+2.12	<sup>h</sup> 21 <sup>m</sup> 2.5	<sup>m</sup> 2.36	<sup>d</sup> 25.3
2	16 26.0	16 31.9	60 12.2	1.94	60 34.1	1.70	21 58.9	2.34	26.3
3	16 37.0	16 41.0	60 52.7	1.40	61 7.4	1.05	22 54.7	2.32	27.3
4	16 43.8	16 45.3	61 17.7	+0.67	61 23.3	+0.26	23 50.1	2.30	28.3
5	16 45.5	16 44.3	61 23.8	-0.17	61 19.2	-0.59	δ		29.3
6	16 41.7	16 37.8	61 9.7	0.99	60 55.6	1.36	0 45.3	2.30	0.9
7	16 32.8	16 26.9	60 37.3	1.68	60 15.4	1.95	1 40.7	2.31	1.9
8	16 20.2	16 12.8	59 50.7	2.16	59 23.8	2.31	2 36.4	2.33	2.9
9	16 5.1	15 57.2	58 55.5	2.40	58 26.5	2.42	3 32.4	2.32	3.9
10	15 49.3	15 41.6	57 57.5	2.40	57 29.0	2.34	4 28.0	2.29	4.9
11	15 34.1	15 27.0	57 1.5	2.24	56 35.4	2.11	5 22.4	2.23	5.9
12	15 20.3	15 14.2	56 11.0	1.96	55 48.6	1.79	6 15.0	2.14	6.9
13	15 8.7	15 3.7	55 28.2	1.61	55 9.9	1.43	7 5.3	2.04	7.9
14	14 59.3	14 55.6	54 53.8	1.25	54 40.0	1.06	7 53.0	1.94	8.9
15	14 52.4	14 49.7	54 28.3	0.89	54 18.6	0.72	8 38.4	1.85	9.9
16	14 47.7	14 46.1	54 11.0	0.55	54 5.3	0.39	9 21.9	1.79	10.9
17	14 45.1	14 44.5	54 1.5	-0.24	53 59.5	-0.10	10 4.1	1.75	11.9
18	14 44.4	14 44.7	53 59.0	+0.02	54 0.0	+0.14	10 45.7	1.73	12.9
19	14 45.3	14 46.3	54 2.4	0.26	54 6.2	0.36	11 27.3	1.75	13.9
20	14 47.7	14 49.4	54 11.2	0.46	54 17.3	0.56	12 9.5	1.79	14.9
21	14 51.4	14 53.7	54 24.6	0.65	54 33.0	0.75	12 53.1	1.86	15.9
22	14 56.3	14 59.2	54 42.6	0.84	54 53.3	0.94	13 38.6	1.94	16.9
23	15 2.4	15 6.0	55 5.1	1.04	55 18.2	1.14	14 26.3	2.03	17.9
24	15 9.9	15 14.1	55 32.5	1.24	55 48.1	1.35	15 16.3	2.13	18.9
25	15 18.7	15 23.6	56 4.9	1.45	56 22.9	1.55	16 8.4	2.21	19.9
26	15 28.8	15 34.4	56 42.1	1.65	57 2.5	1.74	17 2.2	2.26	20.9
27	15 40.2	15 46.3	57 23.9	1.82	57 46.2	1.89	17 56.8	2.28	21.9
28	15 52.5	15 58.8	58 9.1	1.93	58 32.3	1.94	18 51.6	2.27	22.9
29	16 5.1	16 11.3	58 55.5	1.92	59 18.3	1.86	19 46.0	2.26	23.9
30	16 17.3	16 22.8	59 40.1	1.76	60 0.4	1.61	20 40.0	2.25	24.9
31	16 27.7	16 31.9	60 18.5	1.40	60 33.9	1.15	21 33.8	2.25	25.9
32	16 35.2	16 37.5	60 46.0	+0.86	60 54.4	+0.53	22 27.8	2.27	26.9

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 1.					SUNDAY 3.				
0	8 <sup>h</sup> 55 <sup>m</sup> 37.68	2.4434	N. 17° 52' 34.7"	6.757	0	10 <sup>h</sup> 52 <sup>m</sup> 23.67	2.4127	N. 10° 19' 30.4"	11.750
1	8 58 4.29	2.4435	17 45 45.6	6.880	1	10 54 48.40	2.4117	10 7 43.1	11.927
2	9 0 30.90	2.4435	17 38 49.1	7.003	2	10 57 13.07	2.4106	9 55 51.2	11.902
3	9 2 57.51	2.4435	17 31 45.3	7.125	3	10 59 37.68	2.4096	9 43 54.9	11.975
4	9 5 24.12	2.4434	17 24 34.1	7.247	4	11 2 2.22	2.4086	9 31 54.2	12.047
5	9 7 50.72	2.4433	17 17 15.7	7.368	5	11 4 26.70	2.4076	9 19 49.2	12.118
6	9 10 17.32	2.4433	17 9 50.0	7.488	6	11 6 51.13	2.4066	9 7 40.0	12.188
7	9 12 43.91	2.4432	17 2 17.1	7.608	7	11 9 15.50	2.4056	8 55 26.7	12.256
8	9 15 10.50	2.4430	16 54 37.1	7.727	8	11 11 39.80	2.4046	8 43 9.3	12.322
9	9 17 37.07	2.4427	16 46 50.0	7.845	9	11 14 4.05	2.4037	8 30 48.0	12.387
10	9 20 3.62	2.4424	16 38 55.7	7.963	10	11 16 28.24	2.4027	8 18 22.9	12.450
11	9 22 30.16	2.4421	16 30 54.4	8.081	11	11 18 52.37	2.4017	8 5 54.0	12.519
12	9 24 56.67	2.4417	16 22 46.0	8.197	12	11 21 16.45	2.4007	7 53 21.5	12.572
13	9 27 23.16	2.4413	16 14 30.7	8.313	13	11 23 40.47	2.3998	7 40 45.4	12.631
14	9 29 49.63	2.4409	16 6 8.5	8.428	14	11 26 4.43	2.3989	7 28 5.8	12.688
15	9 32 16.07	2.4405	15 57 39.4	8.542	15	11 28 28.34	2.3980	7 15 22.8	12.744
16	9 34 42.49	2.4400	15 49 3.5	8.655	16	11 30 52.19	2.3971	7 2 36.5	12.798
17	9 37 8.88	2.4395	15 40 20.8	8.768	17	11 33 15.99	2.3962	6 49 47.1	12.850
18	9 39 35.23	2.4389	15 31 31.3	8.880	18	11 35 39.73	2.3953	6 36 54.5	12.901
19	9 42 1.55	2.4383	15 22 35.1	8.991	19	11 38 3.42	2.3945	6 23 58.9	12.950
20	9 44 27.83	2.4377	15 13 32.4	9.101	20	11 40 27.07	2.3936	6 11 0.5	12.997
21	9 46 54.07	2.4371	15 4 23.1	9.210	21	11 42 50.66	2.3928	5 57 59.3	13.043
22	9 49 20.28	2.4364	14 55 7.2	9.318	22	11 45 14.20	2.3920	5 44 55.3	13.088
23	9 51 46.45	2.4357	N. 14 45 44.9	9.425	23	11 47 37.69	2.3912	N. 5 31 48.7	13.131
SATURDAY 2.					MONDAY 4.				
0	9 54 12.57	2.4350	N. 14 36 16.2	9.531	0	11 50 1.14	2.3904	N. 5 18 39.6	13.171
1	9 56 38.64	2.4342	14 26 41.1	9.637	1	11 52 24.54	2.3897	5 5 28.1	13.210
2	9 59 4.67	2.4335	14 16 59.7	9.741	2	11 54 47.90	2.3890	4 52 14.4	13.248
3	10 1 30.65	2.4327	14 7 12.1	9.845	3	11 57 11.22	2.3883	4 38 58.4	13.284
4	10 3 56.59	2.4319	13 57 18.3	9.947	4	11 59 34.49	2.3876	4 25 40.3	13.318
5	10 6 22.48	2.4310	13 47 18.4	10.049	5	12 1 57.72	2.3869	4 12 20.2	13.351
6	10 8 48.31	2.4302	13 37 12.4	10.149	6	12 4 20.92	2.3863	3 58 58.2	13.382
7	10 11 14.09	2.4293	13 27 0.4	10.248	7	12 6 44.08	2.3857	3 45 34.4	13.411
8	10 13 39.82	2.4284	13 16 42.6	10.346	8	12 9 7.20	2.3850	3 32 8.9	13.438
9	10 16 5.50	2.4275	13 6 18.9	10.443	9	12 11 30.28	2.3844	3 18 41.8	13.463
10	10 18 31.12	2.4266	12 55 49.4	10.538	10	12 13 53.33	2.3838	3 5 13.3	13.487
11	10 20 56.68	2.4256	12 45 14.2	10.633	11	12 16 16.35	2.3833	2 51 43.4	13.509
12	10 23 22.19	2.4247	12 34 33.4	10.726	12	12 18 39.33	2.3828	2 38 12.2	13.529
13	10 25 47.64	2.4237	12 23 47.0	10.819	13	12 21 2.28	2.3823	2 24 39.8	13.548
14	10 28 13.03	2.4228	12 12 55.1	10.910	14	12 23 25.21	2.3819	2 11 6.4	13.565
15	10 30 38.36	2.4218	12 1 57.8	11.000	15	12 25 48.11	2.3815	1 57 32.0	13.581
16	10 33 3.64	2.4208	11 50 55.1	11.089	16	12 28 10.99	2.3811	1 43 56.7	13.595
17	10 35 28.86	2.4198	11 39 47.1	11.176	17	12 30 33.84	2.3807	1 30 20.6	13.607
18	10 37 54.01	2.4188	11 28 34.0	11.262	18	12 32 56.67	2.3803	1 16 43.9	13.616
19	10 40 19.10	2.4178	11 17 15.7	11.347	19	12 35 19.48	2.3800	1 3 6.7	13.624
20	10 42 44.14	2.4168	11 5 52.4	11.430	20	12 37 42.27	2.3796	0 49 29.0	13.631
21	10 45 9.12	2.4158	10 54 24.2	11.512	21	12 40 5.04	2.3793	0 35 51.0	13.636
22	10 47 34.03	2.4148	10 42 51.0	11.593	22	12 42 27.79	2.3790	0 22 12.7	13.639
23	10 49 58.88	2.4137	10 31 13.0	11.672	23	12 44 50.53	2.3786	N. 0 8 34.3	13.640
24	10 52 23.67	2.4127	N. 10 19 30.4	11.750	24	12 47 13.25	2.3786	S. 0 5 4.1	13.640

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 5.					THURSDAY 7.				
0	12 47 13.25	2.3786	S. 0° 5' 4.1"	13.640	0	14 41 35.48	2.3937	S. 10° 26' 50.9"	11.651
1	12 49 35.96	2.3784	0 18 42.4	13.638	1	14 43 59.12	2.3943	10 38 27.6	11.572
2	12 51 58.66	2.3783	0 32 20.6	13.634	2	14 46 22.80	2.3949	10 49 59.5	11.492
3	12 54 21.35	2.3782	0 45 58.5	13.628	3	14 48 46.52	2.3956	11 1 26.6	11.411
4	12 56 44.04	2.3780	0 59 35.9	13.620	4	14 51 10.27	2.3962	11 12 48.8	11.328
5	12 59 6.72	2.3779	1 13 12.8	13.610	5	14 53 34.06	2.3968	11 24 6.0	11.244
6	13 1 29.39	2.3778	1 26 49.1	13.599	6	14 55 57.88	2.3974	11 35 18.1	11.159
7	13 3 52.06	2.3778	1 40 24.7	13.587	7	14 58 21.74	2.3981	11 46 25.1	11.072
8	13 6 14.73	2.3778	1 53 59.5	13.572	8	15 0 45.65	2.3987	11 57 26.8	10.985
9	13 8 37.40	2.3778	2 7 33.4	13.556	9	15 3 9.59	2.3993	12 8 23.3	10.897
10	13 11 0.07	2.3779	2 21 6.2	13.538	10	15 5 33.56	2.3999	12 19 14.5	10.807
11	13 13 22.75	2.3780	2 34 37.9	13.518	11	15 7 57.57	2.4004	12 30 0.2	10.716
12	13 15 45.43	2.3781	2 48 8.4	13.497	12	15 10 21.61	2.4010	12 40 40.4	10.624
13	13 18 8.12	2.3782	3 1 37.6	13.474	13	15 12 45.69	2.4016	12 51 15.0	10.531
14	13 20 30.81	2.3783	3 15 5.3	13.449	14	15 15 9.80	2.4022	13 1 44.1	10.437
15	13 22 53.51	2.3785	3 28 31.5	13.423	15	15 17 33.94	2.4027	13 12 7.5	10.342
16	13 25 16.23	2.3787	3 41 56.0	13.394	16	15 19 58.12	2.4033	13 22 25.1	10.245
17	13 27 38.96	2.3789	3 55 18.7	13.364	17	15 22 22.33	2.4037	13 32 36.8	10.147
18	13 30 1.70	2.3791	4 8 39.7	13.333	18	15 24 46.57	2.4042	13 42 42.7	10.049
19	13 32 24.46	2.3794	4 21 58.7	13.300	19	15 27 10.84	2.4047	13 52 42.7	9.949
20	13 34 47.23	2.3797	4 35 15.7	13.265	20	15 29 35.13	2.4052	14 2 36.6	9.849
21	13 37 10.02	2.3800	4 48 30.5	13.228	21	15 31 59.45	2.4057	14 12 24.5	9.748
22	13 39 32.83	2.3803	5 1 43.1	13.190	22	15 34 23.81	2.4061	14 22 6.3	9.646
23	13 41 55.66	2.3806	S. 5 14 53.3	13.150	23	15 36 48.19	2.4065	S. 14 31 41.9	9.542
WEDNESDAY 6.					FRIDAY 8.				
0	13 44 18.50	2.3809	S. 5 28 1.1	13.109	0	15 39 12.59	2.4069	S. 14 41 11.3	9.438
1	13 46 41.37	2.3813	5 41 6.4	13.066	1	15 41 37.01	2.4072	14 50 34.4	9.333
2	13 49 4.26	2.3817	5 54 9.0	13.021	2	15 44 1.46	2.4076	14 59 51.2	9.227
3	13 51 27.18	2.3822	6 7 8.9	12.975	3	15 46 25.93	2.4079	15 9 1.6	9.119
4	13 53 50.12	2.3826	6 20 6.0	12.927	4	15 48 50.41	2.4083	15 18 5.5	9.011
5	13 56 13.09	2.3830	6 33 0.1	12.877	5	15 51 14.92	2.4086	15 27 2.9	8.902
6	13 58 36.08	2.3834	6 45 51.2	12.826	6	15 53 39.44	2.4088	15 35 53.8	8.793
7	14 0 59.10	2.3839	6 58 39.2	12.773	7	15 56 3.97	2.4090	15 44 38.1	8.683
8	14 3 22.15	2.3844	7 11 24.0	12.719	8	15 58 28.52	2.4092	15 53 15.8	8.573
9	14 5 45.23	2.3849	7 24 5.5	12.663	9	16 0 53.08	2.4093	16 1 46.8	8.462
10	14 8 8.34	2.3854	7 36 43.6	12.606	10	16 3 17.64	2.4095	16 10 11.2	8.349
11	14 10 31.48	2.3860	7 49 18.2	12.547	11	16 5 42.21	2.4097	16 18 28.8	8.236
12	14 12 54.66	2.3865	8 1 49.2	12.487	12	16 8 6.80	2.4098	16 26 39.5	8.122
13	14 15 17.87	2.3871	8 14 16.6	12.425	13	16 10 31.39	2.4098	16 34 43.4	8.008
14	14 17 41.11	2.3876	8 26 40.2	12.362	14	16 12 55.97	2.4098	16 42 40.4	7.893
15	14 20 4.39	2.3882	8 38 59.9	12.297	15	16 15 20.55	2.4097	16 50 30.5	7.778
16	14 22 27.70	2.3887	8 51 15.8	12.231	16	16 17 45.13	2.4096	16 58 13.7	7.661
17	14 24 51.04	2.3893	9 3 27.7	12.163	17	16 20 9.70	2.4095	17 5 49.9	7.544
18	14 27 14.42	2.3899	9 15 35.4	12.094	18	16 22 34.27	2.4094	17 13 19.0	7.427
19	14 29 37.84	2.3906	9 27 38.9	12.023	19	16 24 58.83	2.4092	17 20 41.1	7.309
20	14 32 1.29	2.3912	9 39 38.2	11.951	20	16 27 23.37	2.4090	17 27 56.1	7.191
21	14 34 24.78	2.3918	9 51 33.1	11.878	21	16 29 47.90	2.4087	17 35 4.0	7.072
22	14 36 48.31	2.3924	10 3 23.6	11.804	22	16 32 12.42	2.4084	17 42 4.7	6.953
23	14 39 11.88	2.3931	10 15 9.6	11.728	23	16 34 36.92	2.4081	17 48 58.3	6.833
24	14 41 35.48	2.3937	S. 10 26 50.9	11.651	24	16 37 1.39	2.4077	S. 17 55 44.6	6.713

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 9.					MONDAY 11.				
0	16 37 1.39	2.4077	S. 17° 55' 44.6"	6.713	0	18 31 16.37	2.3338	S. 20° 55' 40.5"	0.799
1	16 39 25.84	2.4073	18 2 23.7	6.592	1	18 33 36.32	2.3311	20 56 24.4	0.679
2	16 41 50.27	2.4068	18 8 55.6	6.471	2	18 35 56.10	2.3283	20 57 1.1	0.558
3	16 44 14.67	2.4063	18 15 20.2	6.350	3	18 38 15.71	2.3254	20 57 30.7	0.433
4	16 46 39.03	2.4058	18 21 37.6	6.228	4	18 40 35.15	2.3226	20 57 53.1	0.315
5	16 49 3.36	2.4052	18 27 47.6	6.106	5	18 42 54.42	2.3197	20 58 8.4	0.197
6	16 51 27.66	2.4046	18 33 50.3	5.984	6	18 45 13.51	2.3168	20 58 16.7	0.079
7	16 53 51.92	2.4039	18 39 45.6	5.861	7	18 47 32.43	2.3138	20 58 18.0	0.038
8	16 56 16.13	2.4032	18 45 33.6	5.738	8	18 49 51.16	2.3108	20 58 12.2	0.155
9	16 58 40.30	2.4024	18 51 14.2	5.614	9	18 52 9.71	2.3077	20 57 59.4	0.271
10	17 1 4.42	2.4016	18 56 47.3	5.491	10	18 54 28.08	2.3045	20 57 39.7	0.387
11	17 3 28.49	2.4007	19 2 13.0	5.367	11	18 56 46.26	2.3013	20 57 13.0	0.502
12	17 5 52.51	2.3998	19 7 31.3	5.243	12	18 59 4.24	2.2982	20 56 39.4	0.617
13	17 8 16.47	2.3988	19 12 42.2	5.119	13	19 1 22.03	2.2950	20 55 58.9	0.732
14	17 10 40.37	2.3978	19 17 45.6	4.995	14	19 3 39.64	2.2918	20 55 11.6	0.845
15	17 13 4.21	2.3967	19 22 41.5	4.870	15	19 5 57.05	2.2885	20 54 17.5	0.953
16	17 15 27.98	2.3956	19 27 30.0	4.746	16	19 8 14.26	2.2853	20 53 16.6	1.071
17	17 17 51.68	2.3945	19 32 11.0	4.621	17	19 10 31.27	2.2818	20 52 9.0	1.183
18	17 20 15.32	2.3933	19 36 44.5	4.496	18	19 12 48.07	2.2784	20 50 54.6	1.295
19	17 22 38.88	2.3920	19 41 10.5	4.371	19	19 15 4.67	2.2750	20 49 33.5	1.407
20	17 25 2.36	2.3907	19 45 29.0	4.246	20	19 17 21.07	2.2715	20 48 5.8	1.517
21	17 27 25.76	2.3893	19 49 40.0	4.121	21	19 19 37.25	2.2680	20 46 31.5	1.627
22	17 29 49.08	2.3879	19 53 43.5	3.997	22	19 21 53.23	2.2645	20 44 50.6	1.736
23	17 32 12.31	2.3865	S. 19 57 39.5	3.872	23	19 24 9.00	2.2610	S. 20 43 3.2	1.845
SUNDAY 10.					TUESDAY 12.				
0	17 34 35.46	2.3850	S. 20 1 28.1	3.747	0	19 26 24.55	2.2574	S. 20 41 9.2	1.953
1	17 36 58.51	2.3834	20 5 9.2	3.622	1	19 28 39.89	2.2538	20 39 8.8	2.061
2	17 39 21.47	2.3818	20 8 42.7	3.497	2	19 30 55.01	2.2502	20 37 1.9	2.168
3	17 41 44.33	2.3802	20 12 8.7	3.372	3	19 33 9.91	2.2466	20 34 48.6	2.274
4	17 44 7.09	2.3785	20 15 27.3	3.247	4	19 35 24.60	2.2429	20 32 29.0	2.380
5	17 46 29.74	2.3767	20 18 38.4	3.122	5	19 37 39.06	2.2393	20 30 3.0	2.486
6	17 48 52.29	2.3749	20 21 42.0	2.997	6	19 39 53.30	2.2355	20 27 30.7	2.590
7	17 51 14.73	2.3730	20 24 38.1	2.873	7	19 42 7.32	2.2318	20 24 52.1	2.694
8	17 53 37.05	2.3711	20 27 26.8	2.749	8	19 44 21.11	2.2281	20 22 7.4	2.797
9	17 55 59.25	2.3691	20 30 8.0	2.625	9	19 46 34.68	2.2243	20 19 16.5	2.900
10	17 58 21.34	2.3671	20 32 41.8	2.501	10	19 48 48.02	2.2205	20 16 19.4	3.002
11	18 0 43.31	2.3651	20 35 8.1	2.377	11	19 51 1.13	2.2166	20 13 46.2	3.104
12	18 3 5.15	2.3630	20 37 27.0	2.253	12	19 53 14.01	2.2127	20 10 6.9	3.204
13	18 5 26.87	2.3608	20 39 38.5	2.130	13	19 55 26.66	2.2088	20 6 51.6	3.304
14	18 7 48.45	2.3586	20 41 42.6	2.007	14	19 57 39.07	2.2050	20 3 30.4	3.403
15	18 10 9.89	2.3563	20 43 39.3	1.884	15	19 59 51.26	2.2012	20 0 3.2	3.502
16	18 12 31.20	2.3540	20 45 28.7	1.761	16	20 2 3.22	2.1974	19 56 30.1	3.600
17	18 14 52.37	2.3516	20 47 10.7	1.639	17	20 4 14.95	2.1935	19 52 51.1	3.698
18	18 17 13.39	2.3492	20 48 45.4	1.517	18	20 6 26.44	2.1896	19 49 6.3	3.795
19	18 19 34.27	2.3468	20 50 12.7	1.395	19	20 8 37.69	2.1856	19 45 15.7	3.891
20	18 21 55.00	2.3443	20 51 32.8	1.274	20	20 10 48.71	2.1817	19 41 19.4	3.988
21	18 24 15.58	2.3417	20 52 45.6	1.153	21	20 12 59.49	2.1777	19 37 17.4	4.081
22	18 26 36.00	2.3391	20 53 51.1	1.032	22	20 15 10.04	2.1738	19 33 9.7	4.175
23	18 28 56.26	2.3364	20 54 49.4	0.912	23	20 17 20.35	2.1698	19 28 56.4	4.268
24	18 31 16.37	2.3338	S. 20 55 40.5	0.792	24	20 19 30.42	2.1659	S. 19 24 37.5	4.361

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 13.					FRIDAY 15.				
0	20 19 30.42	2.1659	S. 19° 24' 37.5"	4.361	0	21 59 0.42	1.9855	S. 14° 21' 59.7"	7.978
1	20 21 40.25	2.1619	19 20 13.0	4.453	1	22 0 59.45	1.9833	14 13 59.2	8.037
2	20 23 49.85	2.1580	19 15 43.1	4.544	2	22 2 58.29	1.9791	14 5 55.3	8.094
3	20 25 59.21	2.1540	19 11 7.7	4.634	3	22 4 56.94	1.9759	12 57 48.0	8.151
4	20 28 8.33	2.1500	19 6 27.0	4.724	4	22 6 55.40	1.9727	13 49 37.2	8.207
5	20 30 17.21	2.1460	19 1 40.9	4.813	5	22 8 53.67	1.9696	13 41 23.1	8.262
6	20 32 25.85	2.1421	18 56 49.4	4.902	6	22 10 51.75	1.9664	13 33 5.7	8.317
7	20 34 34.25	2.1381	18 51 52.6	4.990	7	22 12 49.64	1.9633	13 24 45.0	8.372
8	20 36 42.42	2.1342	18 46 50.6	5.077	8	22 14 47.35	1.9603	13 16 21.1	8.425
9	20 38 50.35	2.1302	18 41 43.4	5.163	9	22 16 44.88	1.9573	13 7 54.0	8.478
10	20 40 58.04	2.1263	18 36 31.0	5.248	10	22 18 42.23	1.9543	12 59 23.7	8.530
11	20 43 5.49	2.1223	18 31 13.5	5.333	11	22 20 39.40	1.9514	12 50 50.3	8.583
12	20 45 12.71	2.1183	18 25 51.0	5.417	12	22 22 36.40	1.9485	12 42 13.8	8.633
13	20 47 19.69	2.1143	18 20 23.5	5.501	13	22 24 33.22	1.9456	12 33 34.3	8.683
14	20 49 26.43	2.1103	18 14 50.9	5.584	14	22 26 29.87	1.9427	12 24 51.8	8.733
15	20 51 32.93	2.1064	18 9 13.4	5.666	15	22 28 26.35	1.9399	12 16 6.4	8.783
16	20 53 39.20	2.1025	18 3 31.0	5.747	16	22 30 22.66	1.9371	12 7 18.0	8.830
17	20 55 45.23	2.0986	17 57 43.7	5.828	17	22 32 18.81	1.9344	11 58 26.8	8.878
18	20 57 51.03	2.0947	17 51 51.6	5.908	18	22 34 14.79	1.9317	11 49 32.7	8.925
19	20 59 56.59	2.0908	17 45 54.7	5.987	19	22 36 10.61	1.9291	11 40 35.8	8.971
20	21 2 1.92	2.0869	17 39 53.1	6.065	20	22 38 6.28	1.9264	11 31 36.2	9.017
21	21 4 7.02	2.0830	17 33 46.8	6.143	21	22 40 1.79	1.9238	11 22 33.9	9.063
22	21 6 11.88	2.0791	17 27 35.9	6.220	22	22 41 57.14	1.9212	11 13 28.8	9.106
23	21 8 16.51	2.0753	S. 17° 21' 20.4"	6.297	23	22 43 52.34	1.9187	S. 11° 4' 21.1"	9.149
THURSDAY 14.					SATURDAY 16.				
0	21 10 20.92	2.0715	S. 17° 15' 0.3"	6.373	0	22 45 47.39	1.9162	S. 10° 55' 10.9"	9.198
1	21 12 25.10	2.0677	17 8 35.7	6.448	1	22 47 42.29	1.9138	10 45 58.1	9.235
2	21 14 29.04	2.0639	17 2 6.6	6.522	2	22 49 37.05	1.9114	10 36 42.7	9.277
3	21 16 32.76	2.0601	16 55 33.1	6.595	3	22 51 31.66	1.9091	10 27 24.8	9.318
4	21 18 36.25	2.0563	16 48 55.2	6.668	4	22 53 26.14	1.9068	10 18 4.5	9.358
5	21 20 39.52	2.0526	16 42 13.0	6.740	5	22 55 20.48	1.9045	10 8 41.8	9.398
6	21 22 42.56	2.0489	16 35 26.4	6.812	6	22 57 14.68	1.9023	9 59 16.7	9.438
7	21 24 45.38	2.0452	16 28 35.6	6.883	7	22 59 8.75	1.9001	9 49 49.3	9.477
8	21 26 47.98	2.0415	16 21 40.5	6.953	8	23 1 2.69	1.8979	9 40 19.5	9.515
9	21 28 50.36	2.0378	16 14 41.3	7.022	9	23 2 56.50	1.8958	9 30 47.5	9.552
10	21 30 52.51	2.0341	16 7 37.9	7.090	10	23 4 50.18	1.8937	9 21 13.3	9.588
11	21 32 54.44	2.0305	16 0 30.4	7.158	11	23 6 43.74	1.8916	9 11 36.9	9.624
12	21 34 56.17	2.0269	15 53 18.9	7.225	12	23 8 37.17	1.8896	9 1 58.4	9.659
13	21 36 57.68	2.0233	15 46 3.3	7.292	13	23 10 30.48	1.8876	8 52 17.8	9.694
14	21 38 58.97	2.0197	15 38 43.8	7.358	14	23 12 23.68	1.8857	8 42 35.1	9.728
15	21 41 0.05	2.0162	15 31 20.4	7.423	15	23 14 16.77	1.8838	8 32 50.4	9.769
16	21 43 0.92	2.0127	15 23 53.1	7.487	16	23 16 9.74	1.8820	8 23 3.7	9.795
17	21 45 1.58	2.0092	15 16 21.9	7.551	17	23 18 2.60	1.8802	8 13 15.0	9.827
18	21 47 2.02	2.0057	15 8 47.0	7.614	18	23 19 55.36	1.8784	8 3 24.4	9.859
19	21 49 2.26	2.0023	15 1 8.3	7.676	19	23 21 48.01	1.8767	7 53 31.9	9.890
20	21 51 2.30	1.9989	14 53 25.9	7.738	20	23 23 40.56	1.8750	7 43 37.6	9.920
21	21 53 2.13	1.9955	14 45 39.8	7.799	21	23 25 33.01	1.8733	7 33 41.5	9.950
22	21 55 1.76	1.9921	14 37 50.0	7.859	22	23 27 25.36	1.8717	7 23 43.6	9.979
23	21 57 1.19	1.9888	14 29 56.6	7.919	23	23 29 17.62	1.8702	7 13 44.0	10.008
24	21 59 0.42	1.9855	S. 14° 21' 59.7"	7.978	24	23 31 9.79	1.8687	S. 7° 3' 42.7"	10.036

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 17.					TUESDAY 19.				
0	<sup>h</sup> 23 <sup>m</sup> 31 <sup>s</sup> 9.79	1.8687	S. 7° 3' 42.7"	10.036	0	<sup>h</sup> 0 59 <sup>m</sup> 56.81	1.8475	N. 1° 18' 15.7"	10.640
1	23 33 1.87	1.8672	6 53 39.8	10.063	1	1 1 47.68	1.8481	1 28 54.0	10.637
2	23 34 53.86	1.8658	6 43 35.2	10.089	2	1 3 38.58	1.8488	1 39 32.1	10.633
3	23 36 45.76	1.8644	6 33 29.1	10.115	3	1 5 29.53	1.8495	1 50 9.9	10.628
4	23 38 37.59	1.8631	6 23 21.4	10.141	4	1 7 20.52	1.8503	2 0 47.5	10.623
5	23 40 29.34	1.8618	6 13 12.2	10.166	5	1 9 11.56	1.8511	2 11 24.8	10.618
6	23 42 21.01	1.8603	6 3 1.5	10.190	6	1 11 2.65	1.8519	2 22 1.7	10.612
7	23 44 12.61	1.8593	5 52 49.4	10.213	7	1 12 53.79	1.8528	2 32 38.2	10.605
8	23 46 4.13	1.8582	5 42 36.0	10.236	8	1 14 44.99	1.8537	2 43 14.3	10.597
9	23 47 55.59	1.8571	5 32 21.2	10.258	9	1 16 36.24	1.8547	2 53 49.9	10.589
10	23 49 46.98	1.8560	5 22 5.0	10.280	10	1 18 27.55	1.8557	3 4 25.0	10.581
11	23 51 38.31	1.8549	5 11 47.6	10.301	11	1 20 18.92	1.8568	3 14 59.6	10.572
12	23 53 29.57	1.8539	5 1 28.9	10.321	12	1 22 10.36	1.8579	3 25 33.6	10.561
13	23 55 20.78	1.8530	4 51 9.0	10.341	13	1 24 1.87	1.8590	3 36 6.9	10.550
14	23 57 11.93	1.8521	4 40 48.0	10.360	14	1 25 53.44	1.8602	3 46 39.6	10.539
15	23 59 3.03	1.8512	4 30 25.8	10.378	15	1 27 45.09	1.8615	3 57 11.6	10.527
16	0 0 54.08	1.8504	4 20 2.6	10.396	16	1 29 36.82	1.8628	4 7 42.8	10.514
17	0 2 45.08	1.8496	4 9 38.3	10.413	17	1 31 28.63	1.8641	4 18 13.2	10.501
18	0 4 36.03	1.8489	3 59 13.0	10.430	18	1 33 20.51	1.8654	4 28 42.9	10.487
19	0 6 26.94	1.8489	3 48 46.7	10.447	19	1 35 12.48	1.8668	4 39 11.7	10.479
20	0 8 17.82	1.8476	3 38 19.4	10.462	20	1 37 4.53	1.8682	4 49 39.5	10.456
21	0 10 8.66	1.8470	3 27 51.2	10.477	21	1 38 56.67	1.8697	5 0 6.4	10.440
22	0 11 59.46	1.8464	3 17 22.2	10.491	22	1 40 48.90	1.8712	5 10 32.3	10.423
23	0 13 50.23	1.8459	S. 3 6 52.3	10.505	23	1 42 41.22	1.8728	N. 5 20 57.1	10.405
MONDAY 18.					WEDNESDAY 20.				
0	0 15 40.97	1.8455	S. 2 56 21.6	10.518	0	1 44 33.63	1.8744	N. 5 31 20.9	10.387
1	0 17 31.69	1.8451	2 45 50.2	10.530	1	1 46 26.14	1.8761	5 41 43.6	10.368
2	0 19 22.38	1.8447	2 35 18.0	10.542	2	1 48 18.76	1.8778	5 52 5.1	10.348
3	0 21 13.05	1.8443	2 24 45.1	10.553	3	1 50 11.48	1.8795	6 2 25.4	10.328
4	0 23 3.70	1.8440	2 14 11.6	10.563	4	1 52 4.30	1.8812	6 12 44.5	10.307
5	0 24 54.33	1.8437	2 3 37.5	10.573	5	1 53 57.23	1.8830	6 23 2.3	10.285
6	0 26 44.95	1.8435	1 53 2.8	10.582	6	1 55 50.26	1.8849	6 33 18.7	10.263
7	0 28 35.56	1.8434	1 42 27.6	10.591	7	1 57 43.41	1.8868	6 43 33.8	10.240
8	0 30 26.16	1.8433	1 31 51.9	10.599	8	1 59 36.68	1.8887	6 53 47.5	10.216
9	0 32 16.76	1.8433	1 21 15.7	10.607	9	2 1 30.06	1.8907	7 3 59.7	10.192
10	0 34 7.35	1.8432	1 10 39.1	10.613	10	2 3 23.56	1.8927	7 14 10.5	10.167
11	0 35 57.94	1.8432	1 0 2.1	10.619	11	2 5 17.18	1.8947	7 24 19.8	10.141
12	0 37 48.53	1.8432	0 49 24.8	10.624	12	2 7 10.93	1.8968	7 34 27.4	10.114
13	0 39 39.12	1.8433	0 38 47.2	10.629	13	2 9 4.80	1.8989	7 44 33.4	10.087
14	0 41 29.73	1.8435	0 28 9.3	10.633	14	2 10 58.80	1.9011	7 54 37.8	10.059
15	0 43 20.35	1.8438	0 17 31.2	10.637	15	2 12 52.93	1.9033	8 4 40.5	10.030
16	0 45 10.98	1.8440	S. 0 6 52.9	10.640	16	2 14 47.20	1.9055	8 14 41.4	10.000
17	0 47 1.63	1.8443	N. 0 3 45.6	10.642	17	2 16 41.60	1.9078	8 24 40.5	9.970
18	0 48 52.29	1.8446	0 14 24.1	10.643	18	2 18 36.14	1.9101	8 34 37.8	9.939
19	0 50 42.97	1.8449	0 25 2.7	10.644	19	2 20 30.82	1.9125	8 44 33.2	9.908
20	0 52 33.68	1.8453	0 35 41.4	10.644	20	2 22 25.64	1.9149	8 54 26.7	9.876
21	0 54 24.41	1.8458	0 46 20.1	10.644	21	2 24 20.61	1.9173	9 4 18.2	9.843
22	0 56 15.18	1.8463	0 56 58.7	10.643	22	2 26 15.72	1.9197	9 14 7.7	9.808
23	0 58 5.98	1.8469	1 7 37.3	10.642	23	2 28 10.98	1.9222	9 23 55.1	9.773
24	0 59 56.81	1.8475	N. 1 18 15.7	10.640	24	2 30 6.39	1.9247	N. 9 33 40.5	9.738

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 21.					SATURDAY 23.				
0	<sup>h</sup> 2 <sup>m</sup> 30 <sup>s</sup> 6.39	1.9947	N. 9° 33' 40.5"	9.738	0	<sup>h</sup> 4 <sup>m</sup> 5 58.73	2.0791	N. 16° 26' 7.0"	7.151
1	2 32 1.95	1.9973	9 43 23.7	9.702	1	4 8 3.59	2.0828	16 33 13.9	7.078
2	2 33 57.67	1.9999	9 53 4.7	9.665	2	4 10 8.67	2.0865	16 40 16.4	7.005
3	2 35 53.55	1.9996	10 2 43.5	9.628	3	4 12 13.98	2.0903	16 47 14.5	6.931
4	2 37 49.58	1.9959	10 12 20.0	9.590	4	4 14 19.51	2.0940	16 54 8.1	6.856
5	2 39 45.77	1.9379	10 21 54.2	9.551	5	4 16 25.26	2.0977	17 0 57.2	6.789
6	2 41 42.13	1.9406	10 31 26.1	9.511	6	4 18 31.24	2.1014	17 7 41.7	6.703
7	2 43 38.65	1.9434	10 40 55.5	9.470	7	4 20 37.44	2.1052	17 14 21.5	6.625
8	2 45 35.34	1.9462	10 50 22.5	9.429	8	4 22 43.86	2.1089	17 20 56.7	6.547
9	2 47 32.20	1.9490	10 59 47.0	9.387	9	4 24 50.51	2.1127	17 27 27.1	6.468
10	2 49 29.22	1.9518	11 9 9.0	9.344	10	4 26 57.38	2.1164	17 33 52.8	6.388
11	2 51 26.42	1.9547	11 18 28.4	9.301	11	4 29 4.47	2.1201	17 40 13.7	6.308
12	2 53 23.79	1.9576	11 27 45.1	9.257	12	4 31 11.79	2.1238	17 46 29.7	6.227
13	2 55 21.34	1.9606	11 36 59.1	9.212	13	4 33 19.33	2.1276	17 52 40.8	6.144
14	2 57 19.06	1.9636	11 46 10.5	9.166	14	4 35 27.10	2.1313	17 58 47.0	6.061
15	2 59 16.97	1.9667	11 55 19.1	9.119	15	4 37 35.09	2.1351	18 4 48.2	5.978
16	3 1 15.06	1.9697	12 4 24.8	9.072	16	4 39 43.31	2.1388	18 10 44.3	5.894
17	3 3 13.33	1.9728	12 13 27.7	9.024	17	4 41 51.75	2.1425	18 16 35.3	5.808
18	3 5 11.79	1.9758	12 22 27.7	8.975	18	4 44 0.41	2.1462	18 22 21.2	5.722
19	3 7 10.43	1.9789	12 31 24.7	8.926	19	4 46 9.29	2.1499	18 28 1.9	5.635
20	3 9 9.26	1.9821	12 40 18.8	8.875	20	4 48 18.40	2.1536	18 33 37.4	5.548
21	3 11 8.28	1.9853	12 49 9.8	8.824	21	4 50 27.73	2.1573	18 39 7.6	5.460
22	3 13 7.50	1.9885	12 57 57.7	8.772	22	4 52 37.28	2.1610	18 44 32.6	5.371
23	3 15 6.91	1.9918	N. 13° 6' 42.4"	8.719	23	4 54 47.05	2.1647	N. 18° 49' 52.2"	5.282
FRIDAY 22.					SUNDAY 24.				
0	3 17 6.51	1.9950	N. 13° 15' 24.0"	8.666	0	4 56 57.05	2.1684	N. 18° 55' 6.4"	5.192
1	3 19 6.31	1.9983	13 24 2.4	8.612	1	4 59 7.27	2.1721	19 0 15.2	5.101
2	3 21 6.30	2.0016	13 32 37.5	8.557	2	5 1 17.70	2.1758	19 5 18.5	5.009
3	3 23 6.49	2.0049	13 41 9.3	8.502	3	5 3 28.35	2.1794	19 10 16.3	4.917
4	3 25 6.89	2.0083	13 49 37.7	8.445	4	5 5 39.23	2.1830	19 15 8.5	4.823
5	3 27 7.49	2.0117	13 58 2.7	8.388	5	5 7 50.32	2.1866	19 19 55.1	4.729
6	3 29 8.29	2.0151	14 6 24.2	8.330	6	5 10 1.62	2.1902	19 24 36.0	4.635
7	3 31 9.30	2.0185	14 14 42.2	8.271	7	5 12 13.14	2.1938	19 29 11.3	4.540
8	3 33 10.51	2.0219	14 22 56.7	8.211	8	5 14 24.87	2.1974	19 33 40.8	4.444
9	3 35 11.93	2.0253	14 31 7.6	8.151	9	5 16 36.82	2.2009	19 38 4.5	4.347
10	3 37 13.55	2.0288	14 39 14.8	8.090	10	5 18 48.98	2.2044	19 42 22.4	4.250
11	3 39 15.38	2.0323	14 47 18.4	8.028	11	5 21 1.35	2.2079	19 46 34.4	4.152
12	3 41 17.43	2.0358	14 55 18.2	7.965	12	5 23 13.93	2.2114	19 50 40.6	4.053
13	3 43 19.68	2.0393	15 3 14.2	7.902	13	5 25 26.72	2.2148	19 54 40.9	3.954
14	3 45 22.15	2.0429	15 11 6.4	7.838	14	5 27 39.71	2.2183	19 58 35.1	3.854
15	3 47 24.83	2.0465	15 18 54.7	7.772	15	5 29 52.91	2.2217	20 2 23.3	3.753
16	3 49 27.73	2.0501	15 26 39.1	7.706	16	5 32 6.31	2.2251	20 6 5.5	3.652
17	3 51 30.85	2.0537	15 34 19.5	7.639	17	5 34 19.91	2.2284	20 9 41.6	3.550
18	3 53 34.18	2.0573	15 41 55.8	7.572	18	5 36 33.72	2.2317	20 13 11.5	3.447
19	3 55 37.73	2.0609	15 49 28.1	7.504	19	5 38 47.72	2.2350	20 16 35.2	3.344
20	3 57 41.49	2.0645	15 56 56.3	7.435	20	5 41 1.92	2.2383	20 19 52.8	3.240
21	3 59 45.47	2.0682	16 4 20.3	7.366	21	5 43 16.32	2.2416	20 23 4.1	3.136
22	4 1 49.67	2.0718	16 11 40.2	7.295	22	5 45 30.91	2.2448	20 26 9.1	3.031
23	4 3 54.09	2.0755	16 18 55.8	7.223	23	5 47 45.70	2.2480	20 29 7.8	2.926
24	4 5 58.73	2.0791	N. 16° 26' 7.0"	7.151	24	5 50 0.67	2.2511	N. 20° 32' 0.2"	2.820

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 25.					WEDNESDAY 27.				
0	5 <sup>h</sup> 50 <sup>m</sup> 0.67	2.3511	N.20° 32' 0.2	2.880	0	7 <sup>h</sup> 40 <sup>m</sup> 57.09	2.3538	N.20° 36' 6.8	2.776
1	5 52 15.83	2.3542	20 34 46.2	2.713	1	7 43 18.35	2.3548	20 33 16.6	2.898
2	5 54 31.18	2.3573	20 37 25.7	2.606	2	7 45 39.67	2.3557	20 30 19.0	3.020
3	5 56 46.71	2.3604	20 39 58.8	2.498	3	7 48 1.04	2.3566	20 27 14.1	3.143
4	5 59 2.43	2.3635	20 42 25.4	2.389	4	7 50 22.46	2.3575	20 24 1.8	3.265
5	6 1 18.33	2.3665	20 44 45.5	2.280	5	7 52 43.93	2.3583	20 20 42.2	3.388
6	6 3 34.41	2.3694	20 46 59.0	2.171	6	7 55 5.45	2.3590	20 17 15.3	3.510
7	6 5 50.66	2.3723	20 49 6.0	2.061	7	7 57 27.01	2.3597	20 13 41.1	3.632
8	6 8 7.09	2.3752	20 51 6.3	1.950	8	7 59 48.61	2.3603	20 9 59.5	3.754
9	6 10 23.69	2.3780	20 52 59.9	1.838	9	8 2 10.25	2.3609	20 6 10.6	3.876
10	6 12 40.45	2.3808	20 54 46.9	1.727	10	8 4 31.92	2.3614	20 2 14.4	3.997
11	6 14 57.38	2.3836	20 56 27.2	1.615	11	8 6 53.62	2.3619	19 58 10.9	4.118
12	6 17 14.48	2.3863	20 58 0.7	1.502	12	8 9 15.35	2.3624	19 54 0.2	4.240
13	6 19 31.74	2.3890	20 59 27.4	1.389	13	8 11 37.11	2.3628	19 49 42.2	4.362
14	6 21 49.16	2.3917	21 0 47.4	1.276	14	8 13 58.89	2.3632	19 45 16.8	4.483
15	6 24 6.74	2.3943	21 2 0.5	1.162	15	8 16 20.69	2.3635	19 40 44.2	4.603
16	6 26 24.47	2.3969	21 3 6.8	1.048	16	8 18 42.51	2.3638	19 36 4.4	4.724
17	6 28 42.36	2.3994	21 4 6.2	0.933	17	8 21 4.34	2.3640	19 31 17.3	4.845
18	6 31 0.40	2.3019	21 4 58.8	0.818	18	8 23 26.19	2.3642	19 26 23.0	4.966
19	6 33 18.58	2.3043	21 5 44.4	0.702	19	8 25 48.05	2.3644	19 21 21.4	5.086
20	6 35 36.91	2.3066	21 6 23.0	0.586	20	8 28 9.92	2.3645	19 16 12.7	5.206
21	6 37 55.38	2.3089	21 6 54.7	0.470	21	8 30 31.79	2.3646	19 10 56.8	5.325
22	6 40 13.98	2.3112	21 7 19.4	0.353	22	8 32 53.67	2.3646	19 5 33.7	5.444
23	6 42 32.72	2.3135	N.21 7 37.1	0.236	23	8 35 15.55	2.3646	N.19 0 3.5	5.563
TUESDAY 26.					THURSDAY 28.				
0	6 44 51.60	2.3157	N.21 7 47.7	0.118	0	8 37 37.42	2.3646	N.18 54 26.1	5.682
1	6 47 10.61	2.3178	21 7 51.2	0.000	1	8 39 59.29	2.3645	18 48 41.6	5.801
2	6 49 29.74	2.3199	21 7 47.7	0.118	2	8 42 21.16	2.3644	18 42 50.0	5.919
3	6 51 49.00	2.3220	21 7 37.1	0.237	3	8 44 43.02	2.3643	18 36 51.4	6.036
4	6 54 8.38	2.3240	21 7 19.3	0.355	4	8 47 4.87	2.3641	18 30 45.7	6.153
5	6 56 27.88	2.3260	21 6 54.4	0.474	5	8 49 26.71	2.3639	18 24 33.0	6.270
6	6 58 47.50	2.3279	21 6 22.4	0.593	6	8 51 48.54	2.3637	18 18 13.3	6.386
7	7 1 7.23	2.3298	21 5 43.2	0.713	7	8 54 10.35	2.3634	18 11 46.6	6.503
8	7 3 27.07	2.3316	21 4 56.8	0.833	8	8 56 32.15	2.3631	18 5 13.0	6.618
9	7 5 47.02	2.3333	21 4 3.2	0.954	9	8 58 53.93	2.3628	17 58 32.5	6.733
10	7 8 7.07	2.3350	21 3 2.3	1.074	10	9 1 15.68	2.3625	17 51 45.0	6.848
11	7 10 27.22	2.3367	21 1 54.2	1.195	11	9 3 37.41	2.3621	17 44 50.7	6.962
12	7 12 47.47	2.3383	21 0 38.9	1.316	12	9 5 59.13	2.3617	17 37 49.5	7.076
13	7 15 7.82	2.3399	20 59 16.3	1.437	13	9 8 20.82	2.3613	17 30 41.5	7.189
14	7 17 28.26	2.3414	20 57 46.5	1.558	14	9 10 42.48	2.3608	17 23 26.8	7.302
15	7 19 48.79	2.3428	20 56 9.4	1.679	15	9 13 4.11	2.3603	17 16 5.3	7.414
16	7 22 9.40	2.3443	20 54 25.0	1.800	16	9 15 25.71	2.3598	17 8 37.1	7.525
17	7 24 30.10	2.3457	20 52 33.3	1.922	17	9 17 47.28	2.3592	17 1 2.3	7.636
18	7 26 50.88	2.3470	20 50 34.4	2.044	18	9 20 8.81	2.3587	16 53 20.8	7.746
19	7 29 11.74	2.3483	20 48 28.1	2.166	19	9 22 30.31	2.3581	16 45 32.7	7.856
20	7 31 32.67	2.3495	20 46 14.5	2.288	20	9 24 51.78	2.3575	16 37 38.1	7.965
21	7 33 53.68	2.3507	20 43 53.6	2.410	21	9 27 13.21	2.3568	16 29 36.9	8.074
22	7 36 14.75	2.3518	20 41 25.3	2.532	22	9 29 34.60	2.3562	16 21 29.2	8.182
23	7 38 35.89	2.3528	20 38 49.7	2.654	23	9 31 55.95	2.3556	16 13 15.1	8.289
24	7 40 57.09	2.3538	N.20 36 6.8	2.776	24	9 34 17.27	2.3549	N.16 4 54.5	8.396



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 29.					SUNDAY 31.				
0	9 34 17.27	2.3549	N.16° 4' 54.5"	8.306	0	11 26 30.55	2.3949	N. 7° 35' 27.2"	12.439
1	9 36 38.55	2.3542	15 56 27.5	8.502	1	11 28 50.00	2.3940	7 22 59.2	12.495
2	9 38 59.78	2.3535	15 47 54.3	8.607	2	11 31 9.43	2.3938	7 10 27.8	12.550
3	9 41 20.97	2.3528	15 39 14.8	8.711	3	11 33 28.85	2.3936	6 57 53.1	12.604
4	9 43 42.12	2.3521	15 30 29.0	8.814	4	11 35 48.26	2.3934	6 45 15.3	12.656
5	9 46 3.23	2.3514	15 21 37.0	8.917	5	11 38 7.66	2.3933	6 32 34.4	12.707
6	9 48 24.29	2.3507	15 12 38.9	9.019	6	11 40 27.05	2.3932	6 19 50.4	12.757
7	9 50 45.31	2.3499	15 3 34.7	9.121	7	11 42 46.44	2.3931	6 7 3.5	12.806
8	9 53 6.28	2.3492	14 54 24.4	9.222	8	11 45 5.82	2.3930	5 54 13.7	12.853
9	9 55 27.21	2.3484	14 45 8.1	9.322	9	11 47 25.20	2.3929	5 41 21.2	12.898
10	9 57 48.09	2.3477	14 35 45.8	9.421	10	11 49 44.57	2.3929	5 28 26.0	12.942
11	10 0 8.93	2.3470	14 26 17.6	9.518	11	11 52 3.94	2.3930	5 15 28.2	12.984
12	10 2 29.73	2.3462	14 16 43.6	9.615	12	11 54 23.33	2.3931	5 2 27.9	13.025
13	10 4 50.48	2.3454	14 7 3.7	9.712	13	11 56 42.72	2.3932	4 49 25.2	13.065
14	10 7 11.18	2.3446	13 57 18.1	9.808	14	11 59 2.11	2.3933	4 36 20.1	13.103
15	10 9 31.83	2.3438	13 47 26.8	9.903	15	12 1 21.51	2.3935	4 23 12.8	13.140
16	10 11 52.44	2.3430	13 37 29.8	9.996	16	12 3 40.93	2.3937	4 10 3.3	13.176
17	10 14 13.00	2.3422	13 27 27.2	10.089	17	12 6 0.36	2.3939	3 56 51.7	13.210
18	10 16 33.52	2.3415	13 17 19.1	10.181	18	12 8 19.80	2.3942	3 43 38.1	13.242
19	10 18 53.99	2.3408	13 7 5.5	10.273	19	12 10 39.26	2.3945	3 30 22.6	13.273
20	10 21 14.41	2.3400	12 56 46.4	10.362	20	12 12 58.74	2.3948	3 17 5.3	13.302
21	10 23 34.79	2.3393	12 46 22.0	10.451	21	12 15 18.24	2.3952	3 3 46.3	13.330
22	10 25 55.13	2.3385	12 35 52.3	10.539	22	12 17 37.76	2.3956	2 50 25.7	13.356
23	10 28 15.42	2.3378	N.12 25 17.4	10.626	23	12 19 57.31	2.3961	N. 2 37 3.6	13.381
SATURDAY 30.					MONDAY, NOVEMBER 1.				
0	10 30 35.67	2.3371	N.12 14 37.2	10.712	0	12 22 16.89	2.3965	N. 2 23 40.0	13.404
1	10 32 55.88	2.3364	12 3 51.9	10.797	PHASES OF THE MOON.				
2	10 35 16.04	2.3356	11 53 1.6	10.880					
3	10 37 36.16	2.3349	11 42 6.3	10.963					
4	10 39 56.23	2.3342	11 31 6.0	11.046	● New Moon, . . . <sup>d h m</sup> 5 2 19.4 ☽ First Quarter, . . . 11 22 2.5 ○ Full Moon, . . . 20 1 57.4 ☾ Last Quarter, . . . 27 20 34.6				
5	10 42 16.26	2.3336	11 20 0.8	11.127					
6	10 44 36.26	2.3329	11 8 50.8	11.206					
7	10 46 56.22	2.3323	10 57 36.1	11.284					
8	10 49 16.13	2.3317	10 46 16.7	11.361	☾ Perigee, . . . . . <sup>d h</sup> 4 19.3 ☾ Apogee, . . . . . 17 21.6				
9	10 51 36.01	2.3311	10 34 52.7	11.438					
10	10 53 55.86	2.3305	10 23 24.2	11.514					
11	10 56 15.67	2.3299	10 11 51.2	11.588					
12	10 58 35.45	2.3293	10 0 13.7	11.661					
13	11 0 55.20	2.3288	9 48 31.9	11.732					
14	11 3 14.91	2.3283	9 36 45.9	11.803					
15	11 5 34.59	2.3278	9 24 55.7	11.872					
16	11 7 54.24	2.3273	9 13 1.3	11.940					
17	11 10 13.86	2.3268	9 1 2.9	12.007					
18	11 12 33.46	2.3264	8 49 0.5	12.072					
19	11 14 53.03	2.3260	8 36 54.2	12.136					
20	11 17 12.58	2.3256	8 24 44.2	12.199					
21	11 19 32.11	2.3252	8 12 30.4	12.261					
22	11 21 51.61	2.3248	8 0 12.9	12.322					
23	11 24 11.09	2.3245	7 47 51.8	12.381					
24	11 26 30.55	2.3242	N. 7 35 27.2	12.439					

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	$\alpha$ Arietis	W.	95 17 28	2420	97 0 34	2405	98 44 2	2380	100 27 52	2374
	Jupiter	W.	81 6 2	2254	82 53 9	2237	84 40 42	2220	86 28 40	2204
	Aldebaran	W.	63 31 13	2268	65 18 0	2251	67 5 11	2235	68 52 47	2218
	Pollux	W.	20 46 47	2593	22 25 52	2530	24 6 23	2477	25 48 8	2432
	SUN	E.	57 1 44	2599	55 22 48	2582	53 43 28	2565	52 3 45	2546
2	Jupiter	W.	95 34 33	2125	97 24 54	2111	99 15 37	2097	101 6 41	2083
	Aldebaran	W.	77 56 53	2139	79 46 52	2125	81 37 13	2111	83 27 55	2097
	Pollux	W.	34 31 7	2264	36 17 59	2239	38 5 29	2216	39 53 33	2105
	SUN	E.	43 39 35	2472	41 57 42	2459	40 15 31	2446	38 33 2	2435
3	Aldebaran	W.	92 46 24	2038	94 38 59	2028	96 31 50	2018	98 24 56	2009
	Pollux	W.	49 1 12	2107	50 52 0	2094	52 43 8	2081	54 34 36	2070
	SUN	E.	29 56 59	2394	28 13 16	2390	26 29 27	2389	24 45 36	2391
7	SUN	W.	27 25 43	2448	29 8 9	2458	30 50 22	2467	32 32 21	2478
	$\alpha$ Aquilæ	E.	77 41 22	2691	76 4 30	2715	74 28 10	2740	72 52 23	2767
8	SUN	W.	40 58 0	2548	42 38 7	2564	44 17 52	2580	45 57 14	2599
	$\alpha$ Aquilæ	E.	65 3 15	2935	63 31 40	2974	62 0 55	3018	60 31 4	3063
	Fomalhaut	E.	97 19 22	2445	95 36 52	2461	93 54 44	2477	92 12 59	2494
9	SUN	W.	54 7 54	2691	55 44 46	2710	57 21 12	2729	58 57 13	2750
	Mars	W.	17 18 33	2783	18 53 23	2774	20 28 25	2769	22 3 34	2767
	$\alpha$ Aquilæ	E.	53 17 0	3343	51 53 37	3409	50 31 31	3482	49 10 47	3561
	Fomalhaut	E.	83 50 29	2690	82 11 20	2610	80 32 38	2631	78 54 25	2652
	$\alpha$ Pegasi	E.	99 20 51	2719	97 44 37	2735	96 8 43	2751	94 33 11	2769
10	SUN	W.	66 50 44	2848	68 24 9	2869	69 57 8	2888	71 29 42	2908
	Mars	W.	29 58 5	2809	31 32 21	2823	33 6 19	2837	34 39 59	2852
	Venus	W.	27 59 0	3009	29 29 2	3022	30 58 48	3034	32 28 19	3047
	Fomalhaut	E.	70 50 51	2769	69 15 42	2794	67 41 6	2819	66 7 3	2844
	$\alpha$ Pegasi	E.	86 41 24	2863	85 8 18	2863	83 35 38	2905	82 3 25	2926
11	SUN	W.	79 6 22	3004	80 36 30	3022	82 6 16	3040	83 35 39	3059
	Mars	W.	42 23 28	2929	43 55 10	2945	45 26 32	2961	46 57 34	2977
	Venus	W.	39 51 42	3119	41 19 28	3134	42 46 56	3150	44 14 5	3167
	Antares	W.	30 8 30	2843	31 42 2	2844	33 15 33	2846	34 49 1	2849
	Saturn	W.	24 12 56	2697	25 49 40	2712	27 26 4	2726	29 2 9	2741
	Fomalhaut	E.	58 25 15	2982	56 54 40	3013	55 24 43	3043	53 55 24	3075
	$\alpha$ Pegasi	E.	74 29 15	3040	72 59 52	3064	71 30 58	3088	70 2 34	3114
12	SUN	W.	90 57 8	3143	92 24 25	3160	93 51 22	3176	95 18 0	3191
	Mars	W.	54 27 48	3053	55 56 55	3069	57 25 43	3083	58 54 13	3098
	Venus	W.	51 25 7	3242	52 50 26	3268	54 15 27	3271	55 40 12	3266
	Antares	W.	42 34 44	2883	44 7 24	2891	45 39 54	2901	47 12 12	2910
	Saturn	W.	36 57 40	2815	38 31 49	2828	40 5 40	2842	41 39 13	2856
	Fomalhaut	E.	46 39 5	3257	45 14 3	3299	43 49 50	3343	42 26 28	3391
	$\alpha$ Pegasi	E.	62 48 25	3249	61 23 14	3277	59 58 36	3308	58 34 34	3340
	$\alpha$ Arietis	E.	105 13 1	2835	103 41 26	2847	102 10 7	2860	100 39 4	2872
13	SUN	W.	102 26 47	3282	103 51 43	3276	105 16 23	3288	106 40 48	3300
	Mars	W.	66 12 38	3163	67 39 32	3174	69 6 12	3186	70 32 38	3197
	Venus	W.	62 39 52	3353	64 3 2	3365	65 25 58	3377	66 48 41	3389
	Antares	W.	54 50 46	2956	56 21 54	2965	57 52 50	2974	59 23 35	2984

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	$\alpha$ Arietis	W.	102° 12' 4"	2360	103° 56' 36"	2346	105° 41' 28"	2334	107° 26' 38"	2322
	Jupiter	W.	88 17 2	2187	90 5 49	2171	91 55 0	2155	93 44 35	2140
	Aldebaran	W.	70 40 48	2202	72 29 13	2185	74 18 3	2169	76 7 17	2155
	Pollux	W.	27 30 57	2391	29 14 45	2354	30 59 26	2321	32 44 55	2291
	SUN	E.	50 23 39	2533	48 43 11	2516	47 2 20	2501	45 21 8	2486
2	Jupiter	W.	102 58 6	2070	104 49 51	2058	106 41 55	2046	108 34 17	2036
	Aldebaran	W.	85 18 59	2064	87 10 23	2072	89 2 5	2060	90 54 6	2049
	Pollux	W.	41 42 8	2175	43 31 13	2156	45 20 47	2139	47 10 47	2122
	SUN	E.	36 50 17	2424	35 7 17	2414	33 24 2	2405	31 40 35	2399
3	Aldebaran	W.	100 18 16	2001	102 11 49	1994	104 5 33	1987	105 59 27	1981
	Pollux	W.	56 26 22	2059	58 18 25	2049	60 10 43	2040	62 3 15	2032
	SUN	E.	23 1 48	2306	21 18 8	2406	19 34 42	2422	17 51 39	2445
7	SUN	W.	34 14 5	2490	35 55 32	2503	37 36 41	2517	39 17 31	2532
	$\alpha$ Aquilæ	E.	71 17 12	2796	69 42 39	2828	68 8 47	2861	66 35 38	2897
8	SUN	W.	47 36 11	2616	49 14 44	2635	50 52 52	2652	52 30 36	2672
	$\alpha$ Aquilæ	E.	59 2 9	3112	57 34 14	3164	56 7 22	3220	54 41 36	3279
	Fomalhaut	E.	90 31 38	2512	88 50 42	2530	87 10 11	2549	85 30 6	2569
9	SUN	W.	60 32 47	2769	62 7 55	2789	63 42 37	2809	65 16 53	2828
	Mars	W.	23 38 45	2771	25 13 51	2778	26 48 48	2787	28 23 33	2797
	$\alpha$ Aquilæ	E.	47 51 30	3645	46 33 44	3736	45 17 35	3835	44 3 9	3942
	Fomalhaut	E.	77 16 41	2675	75 39 27	2698	74 2 44	2721	72 26 32	2744
	$\alpha$ Pegasi	E.	92 58 2	2786	91 23 16	2805	89 48 54	2823	88 14 56	2843
10	SUN	W.	73 1 51	2927	74 33 35	2946	76 4 55	2966	77 35 50	2985
	Mars	W.	36 13 20	2866	37 46 22	2892	39 19 4	2908	40 51 26	2913
	Venus	W.	33 57 34	3060	35 26 33	3074	36 55 14	3089	38 23 37	3104
	Fomalhaut	E.	64 33 32	2870	63 0 35	2898	61 28 13	2925	59 56 26	2954
	$\alpha$ Pegasi	E.	80 31 39	2948	79 0 21	2969	77 29 30	2993	75 59 8	3016
11	SUN	W.	85 4 39	3076	86 33 18	3094	88 1 35	3111	89 29 31	3127
	Mars	W.	48 28 15	2993	49 58 37	3008	51 28 40	3024	52 58 23	3039
	Venus	W.	45 40 54	3182	47 7 25	3198	48 33 37	3213	49 59 31	3228
	Antares	W.	36 22 25	2854	37 55 43	2861	39 28 52	2867	41 1 53	2875
	Saturn	W.	30 37 54	2756	32 13 20	2771	33 48 26	2785	35 23 13	2801
	Fomalhaut	E.	52 26 44	3109	50 58 45	3143	49 31 28	3179	48 4 54	3217
	$\alpha$ Pegasi	E.	68 34 41	3139	67 7 19	3165	65 40 28	3193	64 14 10	3221
12	SUN	W.	96 44 20	3206	98 10 22	3220	99 36 7	3235	101 1 35	3248
	Mars	W.	60 22 27	3110	61 50 24	3124	63 18 4	3137	64 45 29	3150
	Venus	W.	57 4 40	3300	58 28 52	3314	59 52 47	3327	61 16 27	3340
	Antares	W.	48 44 18	2990	50 16 12	2928	51 47 55	2938	53 19 26	2946
	Saturn	W.	43 12 28	2869	44 45 27	2882	46 18 9	2894	47 50 35	2907
	Fomalhaut	E.	41 4 1	3442	39 42 32	3497	38 22 4	3556	37 2 42	3623
	$\alpha$ Pegasi	E.	57 11 9	3372	55 48 21	3405	54 26 10	3440	53 4 39	3479
	$\alpha$ Arietis	E.	99 8 16	2985	97 37 44	2997	96 7 27	3009	94 37 25	3020
13	SUN	W.	108 5 0	3312	109 28 58	3394	110 52 42	3335	112 16 13	3345
	Mars	W.	71 58 51	3209	73 24 50	3219	74 50 37	3220	76 16 12	3239
	Venus	W.	68 11 10	3400	69 33 26	3410	70 55 31	3421	72 17 24	3431
	Antares	W.	60 54 8	2993	62 24 30	3000	63 54 43	3008	65 24 46	3017

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
13	Saturn	W.	49° 22' 45"	2919	50° 54' 40"	2931	52° 26' 20"	2942	53° 57' 46"	2953
	α Pegasi	E.	51 43 51	3517	50 23 46	3557	49 4 25	3600	47 45 51	3648
	α Arietis	E.	93 7 37	3032	91 38 4	3043	90 8 45	3055	88 39 40	3068
	Jupiter	E.	106 31 7	2853	104 57 48	2866	103 24 45	2876	101 51 56	2887
14	Mars	W.	77 41 35	3248	79 6 47	3258	80 31 48	3266	81 56 39	3274
	Venus	W.	73 39 6	3440	75 0 37	3450	76 21 57	3459	77 43 7	3466
	Antares	W.	66 54 38	3024	68 24 21	3031	69 53 55	3039	71 23 20	3046
	Saturn	W.	61 31 40	3001	63 1 51	3009	64 31 52	3018	66 1 43	3026
	α Arietis	E.	81 17 38	3119	79 49 52	3129	78 22 18	3139	76 54 56	3149
	Jupiter	E.	94 11 3	2935	92 39 28	2943	91 8 4	2951	89 36 50	2959
15	Mars	W.	88 58 41	3310	90 22 41	3315	91 46 35	3321	93 10 22	3327
	Venus	W.	84 26 49	3503	85 47 10	3509	87 7 24	3515	88 27 32	3521
	Antares	W.	78 48 25	3076	80 17 4	3080	81 45 38	3085	83 14 6	3090
	Saturn	W.	73 28 39	3060	74 57 38	3065	76 26 30	3070	77 55 16	3076
	α Aquilæ	W.	40 28 26	4703	41 29 23	4611	42 31 38	4528	43 35 5	4452
	α Arietis	E.	69 41 0	3197	68 14 47	3205	66 48 44	3214	65 22 52	3225
	Jupiter	E.	82 2 57	2992	80 32 34	2997	79 2 18	3002	77 32 8	3008
	Aldebaran	E.	100 52 9	3023	99 22 25	3030	97 52 49	3035	96 23 20	3039
16	Venus	W.	95 6 49	3542	96 26 27	3545	97 46 2	3549	99 5 33	3551
	Antares	W.	90 35 6	3109	92 3 5	3111	93 31 1	3114	94 58 53	3117
	Saturn	W.	85 17 42	3096	86 45 57	3098	88 14 9	3101	89 42 18	3103
	α Aquilæ	W.	49 7 35	4162	50 16 37	4119	51 26 20	4079	52 36 42	4040
	α Arietis	E.	58 16 22	3272	56 51 38	3282	55 27 6	3293	54 2 46	3304
	Jupiter	E.	70 2 44	3027	68 33 5	3030	67 3 29	3033	65 33 57	3035
	Aldebaran	E.	88 57 13	3059	87 28 13	3062	85 59 17	3065	84 30 24	3067
17	Saturn	W.	97 2 26	3110	98 30 23	3111	99 58 19	3111	101 26 15	3113
	α Aquilæ	W.	58 36 55	3892	59 50 23	3869	61 4 14	3847	62 18 28	3826
	α Arietis	E.	47 4 32	3369	45 41 40	3385	44 19 6	3402	42 56 52	3421
	Jupiter	E.	58 6 55	3043	56 37 36	3044	55 8 18	3045	53 39 1	3045
	Aldebaran	E.	77 6 35	3074	75 37 54	3074	74 9 13	3075	72 40 33	3076
18	α Aquilæ	W.	68 34 28	3743	69 50 30	3728	71 6 47	3715	72 23 18	3703
	Fomalhaut	W.	33 59 42	3906	35 12 56	3848	36 27 9	3793	37 42 18	3744
	α Arietis	E.	36 11 44	3549	34 52 14	3584	33 33 22	3624	32 15 14	3671
	Jupiter	E.	46 12 41	3045	44 43 24	3045	43 14 7	3044	41 44 49	3044
	Aldebaran	E.	65 17 11	3073	63 48 28	3071	62 19 43	3070	60 50 57	3069
19	α Aquilæ	W.	78 48 49	3654	80 6 25	3646	81 24 10	3638	82 42 3	3632
	Fomalhaut	W.	44 9 30	3560	45 28 48	3532	46 48 37	3508	48 8 54	3483
	Jupiter	E.	34 18 9	3040	32 48 46	3040	31 19 23	3039	29 49 59	3039
	Aldebaran	E.	53 26 33	3058	51 57 32	3055	50 28 27	3052	48 59 19	3050
	Pollux	E.	97 35 23	3096	96 7 9	3093	94 38 51	3091	93 10 30	3087
20	α Aquilæ	W.	89 13 6	3806	90 31 34	3802	91 50 6	3599	93 8 41	3597
	Fomalhaut	W.	54 56 25	3398	56 18 58	3369	57 41 50	3353	59 5 0	3339
	α Pegasi	W.	41 50 18	3923	43 3 14	3871	44 17 3	3823	45 31 41	3778
	Aldebaran	E.	41 32 42	3033	40 3 10	3029	38 33 33	3026	37 3 52	3022
	Pollux	E.	85 47 43	3069	84 18 56	3066	82 50 5	3062	81 21 9	3059
21	Fomalhaut	W.	66 4 44	3276	67 29 23	3265	68 54 16	3254	70 19 21	3244
	α Pegasi	W.	51 55 25	3601	53 13 58	3574	54 33 1	3547	55 52 33	3522

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
13	Saturn W.	55° 28' 58"	2963	56° 59' 57"	2973	58° 30' 43"	2983	60° 1' 17"	2999
	α Pegasi E.	46 28 8	3696	45 11 17	3747	43 55 20	3803	42 40 21	3865
	α Arietis E.	87 10 49	3077	85 42 11	3088	84 13 47	3099	82 45 36	3110
	Jupiter E.	100 19 20	2897	98 46 57	2907	97 14 47	2916	95 42 49	2926
14	Mars W.	83 21 21	3262	84 45 54	3269	86 10 18	3296	87 34 34	3304
	Venus W.	79 4 9	3475	80 25 1	3489	81 45 45	3489	83 6 21	3497
	Antares W.	72 52 36	3052	74 21 44	3058	75 50 45	3064	77 19 39	3070
	Saturn W.	67 31 24	3033	69 0 56	3041	70 30 18	3047	71 59 32	3053
	α Arietis E.	75 27 46	3158	74 0 47	3168	72 34 0	3178	71 7 24	3188
	Jupiter E.	88 5 46	2968	86 34 51	2973	85 4 5	2980	83 33 27	2989
15	Mars W.	94 34 2	3339	95 57 37	3337	97 21 6	3341	98 44 30	3345
	Venus W.	89 47 33	3505	91 7 29	3530	92 27 20	3534	93 47 7	3538
	Antares W.	84 42 28	3094	86 10 45	3099	87 38 56	3108	89 7 3	3105
	Saturn W.	79 23 55	3060	80 52 29	3064	82 20 58	3088	83 49 22	3091
	α Aquilæ W.	44 39 40	4383	45 45 17	4390	46 51 51	4393	47 59 18	4210
	α Arietis E.	63 57 12	3224	62 31 43	3242	61 6 24	3253	59 41 17	3263
	Jupiter E.	76 2 5	3013	74 32 8	3016	73 2 15	3020	71 32 27	3024
	Aldebaran E.	94 53 56	3044	93 24 38	3048	91 55 25	3052	90 26 17	3066
16	Venus W.	100 25 1	3553	101 44 27	3555	103 3 50	3557	104 23 11	3558
	Antares W.	96 26 42	3119	97 54 28	3121	99 22 12	3123	100 49 54	3125
	Saturn W.	91 10 24	3105	92 38 28	3107	94 6 29	3109	95 34 28	3110
	α Aquilæ W.	53 47 42	4007	54 59 15	3975	56 11 19	3945	57 23 53	3918
	α Arietis E.	52 38 39	3316	51 14 46	3327	49 51 6	3340	48 27 41	3354
	Jupiter E.	64 4 28	3037	62 35 1	3039	61 5 37	3041	59 36 15	3043
	Aldebaran E.	83 1 34	3069	81 32 47	3070	80 4 1	3073	78 35 17	3073
17	Saturn W.	102 54 10	3119	104 22 5	3119	105 50 0	3111	107 17 56	3110
	α Aquilæ W.	63 33 3	3607	64 47 58	3700	66 3 11	3773	67 18 41	3757
	α Arietis E.	41 34 59	3441	40 13 29	3464	38 52 25	3489	37 31 49	3517
	Jupiter E.	52 9 44	3046	50 40 28	3046	49 11 12	3047	47 41 57	3046
	Aldebaran E.	71 11 54	3075	69 43 14	3075	68 14 34	3074	66 45 53	3073
18	α Aquilæ W.	73 40 2	3692	74 56 58	3681	76 14 5	3672	77 31 22	3663
	Fomalhaut W.	38 58 19	3700	40 15 6	3660	41 32 36	3623	42 50 45	3590
	α Arietis E.	30 57 56	3724	29 41 34	3784	28 26 15	3854	27 12 8	3936
	Jupiter E.	40 15 31	3043	38 46 12	3043	37 16 52	3049	35 47 31	3041
	Aldebaran E.	59 22 9	3067	57 53 19	3065	56 24 26	3063	54 55 31	3060
19	α Aquilæ W.	84 0 3	3625	85 18 10	3620	86 36 23	3614	87 54 42	3610
	Fomalhaut W.	49 29 37	3461	50 50 45	3439	52 12 17	3420	53 34 11	3409
	Jupiter E.	28 20 35	3040	26 51 12	3040	25 21 49	3042	23 52 28	3044
	Aldebaran E.	47 30 8	3047	46 0 53	3043	44 31 33	3039	43 2 9	3037
	Pollux E.	91 42 5	3084	90 13 36	3081	88 45 3	3077	87 16 25	3073
20	α Aquilæ W.	94 27 19	3595	95 45 59	3594	97 4 40	3593	98 23 22	3593
	Fomalhaut W.	60 28 26	3395	61 52 8	3319	63 16 6	3300	64 40 18	3288
	α Pegasi W.	46 47 6	3737	48 3 14	3700	49 20 1	3665	50 37 25	3632
	Aldebaran E.	35 34 6	3018	34 4 15	3013	32 34 18	3009	31 4 16	3005
	Pollux E.	79 52 9	3055	78 23 4	3050	76 53 53	3046	75 24 37	3043
21	Fomalhaut W.	71 44 38	3234	73 10 7	3224	74 35 48	3214	76 1 40	3206
	α Pegasi W.	57 12 33	3498	58 32 59	3478	59 53 48	3456	61 15 1	3435

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
21	Pollux	E.	73° 55' 17"	3038	72° 25' 51"	3034	70° 56' 20"	3030	69° 26' 44"	3025
22	Fomalhaut	W.	77 27 42	3197	78 53 55	3188	80 20 18	3179	81 46 52	3172
	α Pegasi	W.	62 36 38	3416	63 58 36	3400	65 20 53	3382	66 43 30	3365
	Pollux	E.	61 57 19	3002	60 27 9	2997	58 56 53	2993	57 26 32	2989
	Regulus	E.	97 36 35	2954	96 5 24	2947	94 34 5	2941	93 2 38	2935
23	Fomalhaut	W.	89 2 4	3133	90 29 34	3125	91 57 13	3118	93 25 1	3111
	α Pegasi	W.	73 41 3	3294	75 5 22	3281	76 29 56	3268	77 54 45	3256
	α Arietis	W.	30 19 8	3527	31 39 2	3468	33 0 2	3415	34 22 2	3366
	Pollux	E.	49 53 23	2967	48 22 29	2963	46 51 30	2960	45 20 27	2956
	Regulus	E.	85 23 19	2900	83 51 0	2893	82 18 32	2885	80 45 54	2878
24	α Pegasi	W.	85 2 12	3202	86 28 19	3191	87 54 39	3182	89 21 10	3173
	α Arietis	W.	41 24 18	3183	42 50 47	3155	44 17 50	3159	45 45 25	3109
	Jupiter	W.	27 16 5	2928	28 49 56	2917	30 24 2	2905	31 58 23	2792
	Pollux	E.	37 44 11	2944	36 12 48	2944	34 41 25	2945	33 10 3	2946
	Regulus	E.	73 0 16	2838	71 26 37	2826	69 52 46	2819	68 18 43	2811
25	α Pegasi	W.	96 36 24	3131	98 3 56	3123	99 31 38	3115	100 59 29	3110
	α Arietis	W.	53 10 37	2993	54 40 58	2974	56 11 43	2955	57 42 52	2937
	Jupiter	W.	39 54 0	2736	41 29 52	2724	43 6 0	2712	44 42 24	2701
	Aldebaran	W.	19 48 7	2769	21 23 15	2757	22 58 39	2746	24 34 18	2735
	Regulus	E.	60 25 27	2762	58 50 9	2751	57 14 37	2741	55 38 51	2731
	SUN	E.	124 25 2	3139	122 57 40	3129	121 30 5	3116	120 2 15	3103
26	α Arietis	W.	65 24 15	2851	66 57 37	2835	68 31 20	2818	70 5 24	2802
	Jupiter	W.	52 48 20	2640	54 26 21	2628	56 4 38	2615	57 43 13	2602
	Aldebaran	W.	32 36 29	2674	34 13 44	2662	35 51 15	2649	37 29 3	2636
	Regulus	E.	47 36 25	2673	45 59 9	2662	44 21 38	2650	42 43 51	2638
	SUN	E.	112 39 11	3039	111 9 46	3025	109 40 4	3012	108 10 6	2997
27	α Arietis	W.	78 0 55	2794	79 37 3	2709	81 13 31	2694	82 50 19	2679
	Jupiter	W.	66 0 35	2535	67 40 59	2522	69 21 42	2508	71 2 44	2494
	Aldebaran	W.	45 42 29	2570	47 22 5	2556	49 2 0	2543	50 42 14	2529
	Regulus	E.	34 30 39	2574	32 51 8	2561	31 11 19	2548	29 31 12	2535
	SUN	E.	100 35 50	2926	99 4 4	2912	97 32 0	2896	95 59 36	2881
28	α Arietis	W.	90 59 19	2806	92 38 6	2592	94 17 12	2578	95 56 37	2564
	Jupiter	W.	79 32 53	2422	81 15 56	2408	82 59 20	2394	84 43 4	2379
	Aldebaran	W.	59 8 20	2457	60 50 34	2442	62 33 9	2428	64 16 4	2413
	SUN	E.	88 12 44	2805	86 38 22	2788	85 3 39	2772	83 28 35	2757
29	Jupiter	W.	93 27 2	2306	95 12 53	2291	96 59 6	2277	98 45 40	2263
	Aldebaran	W.	72 55 57	2339	74 41 0	2325	76 26 23	2311	78 12 7	2296
	Pollux	W.	29 36 15	2492	31 17 39	2464	32 59 43	2437	34 42 25	2411
	SUN	E.	75 28 6	2679	73 50 58	2663	72 13 29	2649	70 35 40	2633
30	Aldebaran	W.	87 6 5	2226	88 53 54	2212	90 42 4	2199	92 30 33	2186
	Pollux	W.	43 24 23	2304	45 10 16	2287	46 56 35	2269	48 43 20	2252
	SUN	E.	62 21 29	2560	60 41 39	2547	59 1 31	2533	57 21 4	2521
31	Pollux	W.	57 42 57	2179	59 31 56	2167	61 21 14	2155	63 10 50	2143
	Regulus	W.	21 31 31	2139	23 21 30	2126	25 11 49	2115	27 2 26	2104
	SUN	E.	48 54 34	2463	47 12 29	2453	45 30 10	2445	43 47 39	2436

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
21	Pollux E.	67 57 2	3021	66 27 15	3016	64 57 22	3011	63 27 23	3007
22	Fomalhaut W.	83 13 35	3163	84 40 28	3155	86 7 31	3148	87 34 43	3140
	α Pegasi W.	68 6 26	3350	69 29 40	3335	70 53 11	3320	72 16 59	3306
	Pollux E.	55 56 5	2985	54 25 33	2980	52 54 55	2976	51 24 12	2971
	Regulus E.	91 31 3	2928	89 59 20	2921	88 27 28	2915	86 55 28	2908
23	Fomalhaut W.	94 52 57	3105	96 21 1	3098	97 49 13	3091	99 17 33	3085
	α Pegasi W.	79 19 48	3245	80 45 4	3233	82 10 34	3222	83 36 17	3212
	α Arietis W.	35 44 57	3393	37 8 42	3383	38 33 13	3347	39 58 26	3314
	Pollux E.	43 49 19	2953	42 18 7	2950	40 46 51	2947	39 15 32	2946
	Regulus E.	79 13 7	2870	77 40 10	2862	76 7 2	2854	74 33 44	2846
24	α Pegasi W.	90 47 52	3163	92 14 45	3155	93 41 48	3147	95 9 1	3138
	α Arietis W.	47 13 32	3078	48 42 8	3056	50 11 11	3034	51 40 41	3014
	Jupiter W.	33 33 1	2781	35 7 54	2770	36 43 1	2759	38 18 23	2747
	Pollux E.	31 38 43	2950	30 7 28	2956	28 36 20	2964	27 5 22	2973
	Regulus E.	66 44 29	2901	65 10 2	2792	63 35 23	2789	62 0 32	2772
25	α Pegasi W.	102 27 27	3103	103 55 33	3097	105 23 46	3092	106 52 5	3087
	α Arietis W.	59 14 24	2919	60 46 19	2901	62 18 36	2884	63 51 15	2868
	Jupiter W.	46 19 3	2989	47 55 58	2977	49 33 9	2965	51 10 36	2952
	Aldebaran W.	26 10 12	2722	27 46 22	2710	29 22 48	2698	30 59 30	2686
	Regulus E.	54 2 52	2719	52 26 38	2708	50 50 9	2697	49 13 25	2685
	SUN E.	118 34 9	3091	117 5 48	3078	115 37 12	3065	114 8 20	3052
26	α Arietis W.	71 39 49	2786	73 14 35	2771	74 49 41	2755	76 25 8	2740
	Jupiter W.	59 22 5	2589	61 1 15	2576	62 40 43	2562	64 20 30	2549
	Aldebaran W.	39 7 9	2624	40 45 32	2610	42 24 13	2597	44 3 12	2584
	Regulus E.	41 5 47	2625	39 27 26	2612	37 48 48	2599	36 9 52	2587
	SUN E.	106 39 50	2984	105 9 17	2969	103 38 26	2955	102 7 17	2941
27	α Arietis W.	84 27 27	2664	86 4 55	2649	87 42 43	2635	89 20 51	2620
	Jupiter W.	72 44 6	2480	74 25 48	2466	76 7 49	2452	77 50 10	2436
	Aldebaran W.	52 22 47	2515	54 3 40	2500	55 44 53	2486	57 26 26	2471
	Regulus E.	27 50 48	2522	26 10 6	2509	24 29 5	2496	22 47 46	2482
	SUN E.	94 26 53	2986	92 53 50	2951	91 20 28	2935	89 46 46	2920
28	α Arietis W.	97 36 22	2551	99 16 25	2538	100 56 46	2525	102 37 25	2512
	Jupiter W.	86 27 9	2364	88 11 35	2349	89 56 23	2335	91 41 32	2320
	Aldebaran W.	65 59 20	2398	67 42 57	2383	69 26 56	2368	71 11 16	2354
	SUN E.	81 53 11	2741	80 17 26	2735	78 41 20	2710	77 4 53	2695
29	Jupiter W.	100 32 34	2249	102 19 49	2235	104 7 25	2220	105 55 22	2207
	Aldebaran W.	79 58 13	2281	81 44 40	2267	83 31 28	2253	85 18 36	2239
	Pollux W.	36 25 44	2387	38 9 37	2365	39 54 2	2344	41 38 58	2324
	SUN E.	68 57 30	2618	67 19 0	2603	65 40 9	2589	64 0 59	2574
30	Aldebaran W.	94 19 21	2174	96 8 28	2161	97 57 54	2150	99 47 37	2139
	Pollux W.	50 30 30	2236	52 18 4	2221	54 6 0	2206	55 54 18	2192
	SUN E.	55 40 20	2508	53 59 18	2496	52 17 59	2485	50 36 24	2474
31	Pollux W.	65 0 43	2132	66 50 53	2122	68 41 18	2113	70 31 57	2105
	Regulus W.	28 53 19	2094	30 44 28	2085	32 35 51	2075	34 27 28	2068
	SUN E.	42 4 56	2429	40 22 2	2422	38 38 59	2417	36 55 48	2412

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S					Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be subtracted from Apparent Time.	Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.			
Mon.	1	<sup>h</sup> 14 <sup>m</sup> 26 <sup>s</sup> 53.08	9.813	S.14° 32' 35.1"	47.95	16' 9.94"	66.98	<sup>m</sup> 16 <sup>s</sup> 18.68	0.043
Tues.	2	14 30 48.99	9.847	14 51 39.1	47.36	16 10.18	67.10	16 19.32	0.009
Wed.	3	14 34 45.72	9.881	15 10 28.6	46.74	16 10.43	67.21	16 19.15	0.025
Thur.	4	14 38 43.27	9.916	15 29 3.1	46.11	16 10.67	67.33	16 18.15	0.060
Frid.	5	14 42 41.66	9.950	15 47 22.4	45.46	16 10.91	67.45	16 16.33	0.094
Sat.	6	14 46 40.88	9.985	16 5 25.9	44.80	16 11.15	67.57	16 13.67	0.129
Sun.	7	14 50 40.92	10.019	16 23 13.3	44.12	16 11.39	67.69	16 10.18	0.163
Mon.	8	14 54 41.79	10.054	16 40 44.2	43.42	16 11.62	67.81	16 5.88	0.198
Tues.	9	14 58 43.49	10.088	16 57 58.0	42.70	16 11.86	67.93	16 0.75	0.232
Wed.	10	15 2 46.03	10.123	17 14 54.3	41.96	16 12.09	68.05	15 54.79	0.267
Thur.	11	15 6 49.40	10.157	17 31 32.8	41.21	16 12.32	68.17	15 48.00	0.301
Frid.	12	15 10 53.60	10.192	17 47 53.0	40.44	16 12.54	68.29	15 40.37	0.336
Sat.	13	15 14 58.64	10.226	18 3 54.7	39.65	16 12.76	68.41	15 31.90	0.370
Sun.	14	15 19 4.52	10.261	18 19 37.3	38.85	16 12.98	68.53	15 22.60	0.405
Mon.	15	15 23 11.22	10.295	18 35 0.4	38.03	16 13.20	68.65	15 12.49	0.439
Tues.	16	15 27 18.74	10.329	18 50 3.8	37.20	16 13.41	68.76	15 1.55	0.473
Wed.	17	15 31 27.10	10.363	19 4 47.0	36.35	16 13.62	68.88	14 49.79	0.507
Thur.	18	15 35 36.28	10.398	19 19 9.6	35.49	16 13.82	68.99	14 37.20	0.542
Frid.	19	15 39 46.29	10.433	19 33 11.4	34.61	16 14.02	69.11	14 23.79	0.577
Sat.	20	15 43 57.12	10.467	19 46 52.0	33.72	16 14.21	69.22	14 9.55	0.611
Sun.	21	15 48 8.78	10.501	20 0 10.8	32.81	16 14.40	69.33	13 54.49	0.645
Mon.	22	15 52 21.24	10.534	20 13 7.8	31.89	16 14.58	69.44	13 38.63	0.678
Tues.	23	15 56 34.50	10.567	20 25 42.6	30.96	16 14.76	69.55	13 21.97	0.711
Wed.	24	16 0 48.56	10.600	20 37 54.5	30.01	16 14.93	69.66	13 4.51	0.744
Thur.	25	16 5 3.41	10.632	20 49 43.5	29.05	16 15.10	69.76	12 46.26	0.776
Frid.	26	16 9 19.03	10.664	21 1 9.4	28.07	16 15.26	69.86	12 27.25	0.808
Sat.	27	16 13 35.39	10.695	21 12 11.6	27.08	16 15.42	69.96	12 7.50	0.839
Sun.	28	16 17 52.48	10.725	21 22 49.8	26.07	16 15.58	70.05	11 47.02	0.869
Mon.	29	16 22 10.30	10.754	21 33 3.7	25.06	16 15.73	70.15	11 25.81	0.898
Tues.	30	16 26 28.82	10.783	21 42 53.1	24.03	16 15.88	70.24	11 3.91	0.927
Wed.	31	16 30 48.01	10.811	S.21 52 17.7	22.99	16 16.03	70.33	10 41.34	0.955

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.19 from the Sidereal Time.



AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S				Equation of Time, to be added to Mean Time.	Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.			
		<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>o</sup> <sup>'</sup> <sup>"</sup>	<sup>"</sup>	<sup>m</sup> <sup>s</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>
Mon.	1	14 26 55.75	9.813	S. 14 32 48.2	47.95	16 18.69	0.043	14 43 14.44
Tues.	2	14 30 51.67	9.847	14 51 52.0	47.36	16 19.32	0.009	14 47 10.99
Wed.	3	14 34 48.41	9.881	15 10 41.3	46.74	16 19.14	0.025	14 51 7.55
Thur.	4	14 38 45.97	9.916	15 29 15.6	46.11	16 18.13	0.060	14 55 4.10
Frid.	5	14 42 44.36	9.950	15 47 34.7	45.46	16 16.30	0.094	14 59 0.66
Sat.	6	14 46 43.58	9.985	16 5 38.0	44.80	16 13.63	0.129	15 2 57.21
Sun.	7	14 50 43.63	10.019	16 23 25.2	44.12	16 10.14	0.163	15 6 53.77
Mon.	8	14 54 44.49	10.054	16 40 55.8	43.42	16 5.83	0.198	15 10 50.32
Tues.	9	14 58 46.18	10.088	16 58 9.4	42.70	16 0.70	0.232	15 14 46.88
Wed.	10	15 2 48.71	18.123	17 15 5.5	41.96	15 54.72	0.267	15 18 43.43
Thur.	11	15 6 52.07	10.157	17 31 43.7	41.21	15 47.92	0.301	15 22 39.99
Frid.	12	15 10 56.26	10.192	17 48 3.6	40.44	15 40.28	0.336	15 26 36.54
Sat.	13	15 15 1.29	10.226	18 4 5.0	39.65	15 31.81	0.370	15 30 33.10
Sun.	14	15 19 7.15	10.261	18 19 47.3	38.85	15 22.50	0.405	15 34 29.65
Mon.	15	15 23 13.83	10.295	18 35 10.1	38.03	15 12.38	0.439	15 38 26.21
Tues.	16	15 27 21.33	10.329	18 50 13.1	37.20	15 1.43	0.473	15 42 22.76
Wed.	17	15 31 29.66	10.363	19 4 56.0	36.35	14 49.66	0.507	15 46 19.32
Thur.	18	15 35 38.82	10.398	19 19 18.3	35.49	14 37.06	0.542	15 50 15.88
Frid.	19	15 39 48.79	10.433	19 33 19.7	34.61	14 23.64	0.577	15 54 12.43
Sat.	20	15 43 59.59	10.467	19 46 59.9	33.72	14 9.40	0.611	15 58 8.99
Sun.	21	15 48 11.21	10.501	20 0 18.5	32.81	13 54.33	0.645	16 2 5.54
Mon.	22	15 52 23.63	10.534	20 13 15.1	31.89	13 38.47	0.678	16 6 2.10
Tues.	23	15 56 36.85	10.567	20 25 49.4	30.96	13 21.81	0.711	16 9 58.66
Wed.	24	16 0 50.87	10.600	20 38 1.0	30.01	13 4.34	0.744	16 13 55.21
Thur.	25	16 5 5.67	10.632	20 49 49.7	29.05	12 46.10	0.776	16 17 51.77
Frid.	26	16 9 21.24	10.664	21 1 15.2	28.07	12 27.08	0.808	16 21 48.32
Sat.	27	16 13 37.55	10.695	21 12 17.1	27.08	12 7.33	0.839	16 25 44.88
Sun.	28	16 17 54.59	10.725	21 22 54.9	26.07	11 46.85	0.869	16 29 41.44
Mon.	29	16 22 12.35	10.754	21 33 8.4	25.06	11 25.64	0.898	16 33 37.99
Tues.	30	16 26 30.81	10.783	21 42 57.5	24.03	11 3.74	0.927	16 37 34.55
Wed.	31	16 30 49.94	10.811	S. 21 52 21.7	22.99	10 41.17	0.955	16 41 31.11
NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.								Diff. for 1 hour + 9 <sup>s</sup> .8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S					Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	305	219° 7' 58.0	7' 32.2	150.33	+0.48	9.9964305	45.5	9 15 14.35	
2	306	220 8 7.0	7 41.0	150.41	0.51	.9963213	45.3	9 11 18.44	
3	307	221 8 17.9	7 51.8	150.49	0.52	.9962126	45.1	9 7 22.53	
4	308	222 8 30.7	8 4.5	150.57	0.49	.9961045	44.9	9 3 26.62	
5	309	223 8 45.3	8 19.0	150.64	0.44	.9959969	44.7	8 59 30.71	
6	310	224 9 1.6	8 35.1	150.71	0.36	.9958899	44.4	8 55 34.80	
7	311	225 9 19.5	8 52.9	150.78	0.26	.9957835	44.1	8 51 38.89	
8	312	226 9 38.9	9 12.2	150.84	0.14	.9956779	43.8	8 47 42.98	
9	313	227 9 59.8	9 33.0	150.90	+0.01	.9955732	43.4	8 43 47.07	
10	314	228 10 22.2	9 55.2	150.96	-0.13	.9954696	42.9	8 39 51.16	
11	315	229 10 45.9	10 18.7	151.02	0.26	.9953671	42.4	8 35 55.25	
12	316	230 11 11.0	10 43.7	151.08	0.39	.9952659	41.8	8 31 59.35	
13	317	231 11 37.5	11 10.1	151.14	0.50	.9951662	41.1	8 28 3.44	
14	318	232 12 5.3	11 37.8	151.19	0.59	.9950682	40.4	8 24 7.53	
15	319	233 12 34.5	12 6.8	151.25	0.65	.9949721	39.7	8 20 11.62	
16	320	234 13 5.0	12 37.1	151.30	0.69	.9948780	38.9	8 16 15.71	
17	321	235 13 36.8	13 8.8	151.36	0.69	.9947858	38.1	8 12 19.80	
18	322	236 14 10.0	13 41.9	151.42	0.66	.9946956	37.2	8 8 23.89	
19	323	237 14 44.7	14 16.5	151.48	0.60	.9946076	36.3	8 4 27.98	
20	324	238 15 20.9	14 52.5	151.54	0.52	.9945219	35.3	8 0 32.08	
21	325	239 15 58.7	15 30.1	151.60	0.42	.9944385	34.4	7 56 36.17	
22	326	240 16 38.0	16 9.3	151.67	0.30	.9943573	33.4	7 52 40.26	
23	327	241 17 18.8	16 50.0	151.73	0.16	.9942781	32.5	7 48 44.35	
24	328	242 18 1.3	17 32.3	151.80	-0.02	.9942010	31.6	7 44 48.43	
25	329	243 18 45.3	18 16.1	151.86	+0.11	.9941260	30.8	7 40 52.52	
26	330	244 19 30.9	19 1.5	151.93	0.22	.9940529	30.0	7 36 56.61	
27	331	245 20 18.1	19 48.6	151.99	0.31	.9939816	29.3	7 33 0.70	
28	332	246 21 6.8	20 37.2	152.06	0.38	.9939119	28.7	7 29 4.79	
29	333	247 21 57.0	21 27.2	152.12	0.42	.9938438	28.1	7 25 8.87	
30	334	248 22 48.6	22 18.6	152.18	0.43	.9937772	27.5	7 21 12.96	
31	335	249 23 41.5	23 11.4	152.23	+0.41	9.9937120	26.9	7 17 17.05	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.								Diff. for 1 hour —9 <sup>m</sup> .830	

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.

## SEMI-DIAMETER.

## HORIZONTAL PARALLAX.

## MERIDIAN PASSAGE.

## AGE.

	SEMI-DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
1	16' 35.2	16' 37.5	60' 46.0	+0.86	60' 54.4	+0.53	<sup>h</sup> 22 <sup>m</sup> 27.8	<sup>m</sup> 2.27	<sup>d</sup> 26.9
2	16 38.6	16 38.6	60 58.6	+0.17	60 58.4	-0.20	23 22.6	2.31	27.9
3	16 37.3	16 34.8	60 53.7	-0.58	60 44.6	0.94	δ		28.9
4	16 31.2	16 26.5	60 31.2	1.28	60 13.9	1.59	0 18.6	2.35	0.5
5	16 20.8	16 14.4	59 53.2	1.85	59 29.7	2.06	1 15.6	2.38	1.5
6	16 7.4	16 0.0	59 3.9	2.22	58 36.7	2.32	2 13.1	2.38	2.5
7	15 52.4	15 44.7	58 8.6	2.36	57 40.3	2.35	3 10.1	2.34	3.5
8	15 37.1	15 29.7	57 12.5	2.29	56 45.5	2.19	4 5.5	2.25	4.5
9	15 22.8	15 16.3	56 19.9	2.06	55 56.1	1.91	4 58.3	2.14	5.5
10	15 10.3	15 5.0	55 34.3	1.73	55 14.7	1.54	5 48.1	2.01	6.5
11	15 0.3	14 56.3	54 57.4	1.34	54 42.6	1.13	6 35.0	1.90	7.5
12	14 52.9	14 50.2	54 30.3	0.92	54 20.5	0.71	7 19.5	1.81	8.5
13	14 48.2	14 46.9	54 13.1	0.51	54 8.1	-0.32	8 2.1	1.75	9.5
14	14 46.1	14 46.0	54 5.4	-0.13	54 4.9	+0.04	8 43.7	1.73	10.5
15	14 46.4	14 47.3	54 6.5	+0.21	54 9.9	0.36	9 25.1	1.73	11.5
16	14 48.8	14 50.6	54 15.1	0.50	54 21.8	0.62	10 7.0	1.77	12.5
17	14 52.8	14 55.3	54 29.9	0.73	54 39.2	0.82	10 50.3	1.84	13.5
18	14 58.2	15 1.2	54 49.6	0.90	55 0.8	0.97	11 35.4	1.93	14.5
19	15 4.5	15 7.9	55 12.8	1.03	55 25.5	1.08	12 22.8	2.03	15.5
20	15 11.5	15 15.2	55 38.7	1.12	55 52.3	1.16	13 12.7	2.13	16.5
21	15 19.1	15 23.0	56 6.4	1.19	56 20.8	1.21	14 4.9	2.21	17.5
22	15 27.0	15 31.1	56 35.5	1.24	56 50.6	1.26	14 58.7	2.25	18.5
23	15 35.3	15 39.5	57 5.9	1.28	57 21.4	1.30	15 53.1	2.26	19.5
24	15 43.8	15 48.1	57 37.2	1.32	57 53.1	1.33	16 47.3	2.24	20.5
25	15 52.5	15 56.9	58 9.1	1.34	58 25.1	1.33	17 40.7	2.20	21.5
26	16 1.2	16 5.4	58 41.0	1.31	58 56.4	1.26	18 33.1	2.17	22.5
27	16 9.4	16 13.2	59 11.3	1.20	59 25.2	1.11	19 24.9	2.16	23.5
28	16 16.6	16 19.6	59 37.8	0.99	59 48.8	0.83	20 16.5	2.17	24.5
29	16 22.1	16 23.9	59 57.8	0.65	60 4.4	+0.44	21 8.9	2.21	25.5
30	16 24.9	16 25.2	60 8.2	+0.20	60 9.1	-0.06	22 2.6	2.27	26.5
31	16 24.5	16 23.0	60 6.7	-0.33	60 1.0	-0.61	22 58.1	2.34	27.5

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 1.					WEDNESDAY 3.				
0	12 22 16.89	2.3265	N. 2 23 40.0	13.404	0	14 15 7.55	2.3862	S. 8 15 40.7	12.800
1	12 24 36.50	2.3270	2 10 15.1	13.426	1	14 17 30.78	2.3881	8 28 15.0	12.543
2	12 26 56.13	2.3276	1 56 48.9	13.446	2	14 19 54.12	2.3899	8 40 45.8	12.494
3	12 29 15.80	2.3282	1 43 21.5	13.465	3	14 22 17.57	2.3918	8 53 13.1	12.434
4	12 31 35.51	2.3288	1 29 53.1	13.482	4	14 24 41.13	2.3936	9 5 36.7	12.362
5	12 33 55.26	2.3294	1 16 23.7	13.497	5	14 27 4.80	2.3955	9 17 56.5	12.298
6	12 36 15.04	2.3301	1 2 53.5	13.511	6	14 29 28.59	2.3973	9 30 12.5	12.233
7	12 38 34.86	2.3308	0 49 22.5	13.523	7	14 31 52.49	2.3992	9 42 24.5	12.167
8	12 40 54.73	2.3315	0 35 50.8	13.534	8	14 34 16.50	2.4010	9 54 32.5	12.098
9	12 43 14.65	2.3323	0 22 18.5	13.543	9	14 36 40.62	2.4029	10 6 36.3	12.028
10	12 45 34.61	2.3331	N. 0 8 45.7	13.550	10	14 39 4.85	2.4048	10 18 35.9	11.957
11	12 47 54.62	2.3340	S. 0 4 47.5	13.555	11	14 41 29.19	2.4067	10 30 31.1	11.884
12	12 50 14.69	2.3349	0 18 20.9	13.559	12	14 43 53.65	2.4085	10 42 22.0	11.810
13	12 52 34.81	2.3358	0 31 54.5	13.562	13	14 46 18.22	2.4104	10 54 8.4	11.735
14	12 54 54.99	2.3367	0 45 28.3	13.563	14	14 48 42.90	2.4122	11 5 50.2	11.658
15	12 57 15.22	2.3377	0 59 2.0	13.561	15	14 51 7.69	2.4141	11 17 27.3	11.579
16	12 59 35.52	2.3387	1 12 35.6	13.558	16	14 53 32.59	2.4159	11 28 59.7	11.499
17	13 1 55.88	2.3398	1 26 9.0	13.554	17	14 55 57.60	2.4178	11 40 27.2	11.417
18	13 4 16.30	2.3410	1 39 42.1	13.548	18	14 58 22.73	2.4196	11 51 49.7	11.334
19	13 6 36.79	2.3421	1 53 14.8	13.541	19	15 0 47.97	2.4215	12 3 7.2	11.249
20	13 8 57.35	2.3432	2 6 47.0	13.532	20	15 3 13.31	2.4233	12 14 19.6	11.164
21	13 11 17.98	2.3443	2 20 18.6	13.521	21	15 5 38.76	2.4251	12 25 26.8	11.077
22	13 13 38.67	2.3455	2 33 49.5	13.508	22	15 8 4.32	2.4269	12 36 28.8	10.988
23	13 15 59.44	2.3468	S. 2 47 19.6	13.494	23	15 10 29.98	2.4286	S. 12 47 25.4	10.898
TUESDAY 2.					THURSDAY 4.				
0	13 18 20.29	2.3481	S. 3 0 48.8	13.478	0	15 12 55.75	2.4304	S. 12 58 16.5	10.806
1	13 20 41.21	2.3494	3 14 17.0	13.461	1	15 15 21.62	2.4321	13 9 2.1	10.713
2	13 23 2.22	2.3508	3 27 44.1	13.442	2	15 17 47.60	2.4338	13 19 42.1	10.619
3	13 25 23.31	2.3522	3 41 10.0	13.422	3	15 20 13.68	2.4355	13 30 16.4	10.524
4	13 27 44.48	2.3535	3 54 34.7	13.399	4	15 22 39.86	2.4372	13 40 45.0	10.428
5	13 30 5.73	2.3549	4 7 58.0	13.375	5	15 25 6.14	2.4388	13 51 7.8	10.330
6	13 32 27.07	2.3564	4 21 19.7	13.349	6	15 27 32.52	2.4405	14 1 24.6	10.231
7	13 34 48.50	2.3579	4 34 39.9	13.322	7	15 29 59.00	2.4421	14 11 35.5	10.131
8	13 37 10.02	2.3594	4 47 58.4	13.293	8	15 32 25.57	2.4436	14 21 40.3	10.030
9	13 39 31.63	2.3609	5 1 15.1	13.262	9	15 34 52.23	2.4451	14 31 39.0	9.927
10	13 41 53.33	2.3624	5 14 29.8	13.229	10	15 37 18.98	2.4466	14 41 31.5	9.823
11	13 44 15.12	2.3640	5 27 42.5	13.194	11	15 39 45.82	2.4481	14 51 17.8	9.718
12	13 46 37.01	2.3656	5 40 53.1	13.158	12	15 42 12.75	2.4495	15 0 57.7	9.612
13	13 48 59.00	2.3673	5 54 1.5	13.121	13	15 44 39.76	2.4509	15 10 31.2	9.505
14	13 51 21.08	2.3689	6 7 7.6	13.082	14	15 47 6.86	2.4523	15 19 58.3	9.397
15	13 53 43.26	2.3706	6 20 11.3	13.042	15	15 49 34.04	2.4537	15 29 18.8	9.287
16	13 56 5.55	2.3722	6 33 12.6	13.000	16	15 52 1.30	2.4550	15 38 32.8	9.176
17	13 58 27.94	2.3739	6 46 11.3	12.955	17	15 54 28.63	2.4562	15 47 40.1	9.065
18	14 0 50.42	2.3756	6 59 7.2	12.909	18	15 56 56.04	2.4574	15 56 40.6	8.953
19	14 3 13.01	2.3774	7 12 0.3	12.862	19	15 59 23.52	2.4585	16 5 34.4	8.839
20	14 5 35.71	2.3791	7 24 50.6	12.813	20	16 1 51.06	2.4596	16 14 21.3	8.724
21	14 7 58.51	2.3809	7 37 37.9	12.762	21	16 4 18.67	2.4607	16 23 1.3	8.609
22	14 10 21.42	2.3826	7 50 22.0	12.710	22	16 6 46.35	2.4617	16 31 34.4	8.493
23	14 12 44.43	2.3844	8 3 3.0	12.656	23	16 9 14.09	2.4627	16 40 0.5	8.377
24	14 15 7.55	2.3862	S. 8 15 40.7	12.600	24	16 11 41.88	2.4636	S. 16 48 19.6	8.259

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 5.					SUNDAY 7.				
0	16 11 41.88	2.4636	S. 16° 48' 19.6"	8.259	0	18 9 50.53	2.4322	S. 20° 57' 48.8"	2.031
1	16 14 9.73	2.4645	16 56 31.5	8.139	1	18 12 16.40	2.4298	20 59 46.7	1.899
2	16 16 37.62	2.4653	17 4 36.3	8.019	2	18 14 42.11	2.4273	21 1 36.7	1.767
3	16 19 5.56	2.4661	17 12 33.9	7.899	3	18 17 7.67	2.4248	21 3 18.8	1.636
4	16 21 33.55	2.4668	17 20 24.2	7.778	4	18 19 33.08	2.4222	21 4 53.0	1.505
5	16 24 1.58	2.4675	17 28 7.2	7.655	5	18 21 58.33	2.4195	21 6 19.4	1.374
6	16 26 29.65	2.4681	17 35 42.8	7.532	6	18 24 23.42	2.4167	21 7 37.9	1.244
7	16 28 57.75	2.4687	17 43 11.0	7.409	7	18 26 48.34	2.4139	21 8 48.7	1.115
8	16 31 25.89	2.4691	17 50 31.9	7.285	8	18 29 13.09	2.4110	21 9 51.7	0.985
9	16 33 54.05	2.4695	17 57 45.3	7.160	9	18 31 37.66	2.4081	21 10 46.9	0.856
10	16 36 22.23	2.4699	18 4 51.1	7.034	10	18 34 2.06	2.4050	21 11 34.4	0.727
11	16 38 50.43	2.4702	18 11 49.4	6.908	11	18 36 26.27	2.4019	21 12 14.2	0.599
12	16 41 18.65	2.4705	18 18 40.1	6.782	12	18 38 50.29	2.3988	21 12 46.3	0.472
13	16 43 46.88	2.4707	18 25 23.2	6.655	13	18 41 14.12	2.3956	21 13 10.8	0.345
14	16 46 15.13	2.4708	18 31 58.7	6.527	14	18 43 37.76	2.3923	21 13 27.7	0.213
15	16 48 43.38	2.4708	18 38 26.5	6.398	15	18 46 1.20	2.3890	21 13 37.0	0.093
16	16 51 11.63	2.4708	18 44 46.5	6.269	16	18 48 24.44	2.3856	21 13 38.8	0.033
17	16 53 39.87	2.4707	18 50 58.8	6.140	17	18 50 47.47	2.3821	21 13 33.0	0.159
18	16 56 8.11	2.4705	18 57 3.3	6.010	18	18 53 10.29	2.3786	21 13 19.7	0.284
19	16 58 36.34	2.4703	19 3 0.0	5.880	19	18 55 32.90	2.3751	21 12 58.9	0.408
20	17 1 4.55	2.4700	19 8 48.9	5.750	20	18 57 55.30	2.3715	21 12 30.8	0.531
21	17 3 32.74	2.4697	19 14 30.0	5.619	21	19 0 17.48	2.3678	21 11 55.3	0.653
22	17 6 0.91	2.4692	19 20 3.2	5.488	22	19 2 39.43	2.3641	21 11 12.4	0.776
23	17 8 29.05	2.4687	S. 19° 25' 28.5"	5.356	23	19 5 1.16	2.3603	S. 21° 10' 22.2"	0.898
SATURDAY 6.					MONDAY 8.				
0	17 10 57.15	2.4681	S. 19° 30' 45.9"	5.224	0	19 7 22.66	2.3565	S. 21° 9' 24.7"	1.018
1	17 13 25.22	2.4675	19 35 55.4	5.092	1	19 9 43.93	2.3526	21 8 20.0	1.138
2	17 15 53.25	2.4668	19 40 57.0	4.960	2	19 12 4.97	2.3487	21 7 8.1	1.258
3	17 18 21.23	2.4660	19 45 50.6	4.827	3	19 14 25.77	2.3447	21 5 49.0	1.377
4	17 20 49.17	2.4651	19 50 36.2	4.694	4	19 16 46.33	2.3407	21 4 22.8	1.495
5	17 23 17.05	2.4642	19 55 13.8	4.561	5	19 19 6.65	2.3367	21 2 49.5	1.613
6	17 25 44.87	2.4632	19 59 43.5	4.428	6	19 21 26.73	2.3326	21 1 9.2	1.730
7	17 28 12.63	2.4621	20 4 5.2	4.294	7	19 23 46.56	2.3284	20 59 21.9	1.847
8	17 30 40.32	2.4609	20 8 18.8	4.161	8	19 26 6.14	2.3242	20 57 27.6	1.962
9	17 33 7.94	2.4597	20 12 24.4	4.028	9	19 28 25.47	2.3200	20 55 26.4	2.077
10	17 35 35.48	2.4583	20 16 22.1	3.895	10	19 30 44.54	2.3157	20 53 18.3	2.191
11	17 38 2.94	2.4569	20 20 11.8	3.761	11	19 33 3.35	2.3114	20 51 3.4	2.304
12	17 40 30.31	2.4555	20 23 53.4	3.627	12	19 35 21.91	2.3071	20 48 41.8	2.417
13	17 42 57.60	2.4540	20 27 27.0	3.493	13	19 37 40.21	2.3027	20 46 13.4	2.529
14	17 45 24.79	2.4524	20 30 52.6	3.360	14	19 39 58.24	2.2983	20 43 38.3	2.640
15	17 47 51.88	2.4507	20 34 10.2	3.226	15	19 42 16.01	2.2939	20 40 56.6	2.750
16	17 50 18.87	2.4489	20 37 19.7	3.093	16	19 44 33.51	2.2894	20 38 8.3	2.859
17	17 52 45.75	2.4471	20 40 21.2	2.959	17	19 46 50.74	2.2849	20 35 13.5	2.968
18	17 55 12.52	2.4452	20 43 14.8	2.826	18	19 49 7.70	2.2804	20 32 12.1	3.076
19	17 57 39.17	2.4432	20 46 0.4	2.693	19	19 51 24.39	2.2759	20 29 4.3	3.184
20	18 0 5.70	2.4411	20 48 38.0	2.560	20	19 53 40.81	2.2713	20 25 50.0	3.290
21	18 2 32.10	2.4390	20 51 7.6	2.428	21	19 55 56.95	2.2667	20 22 29.4	3.396
22	18 4 58.38	2.4368	20 53 29.3	2.295	22	19 58 12.82	2.2621	20 19 2.5	3.500
23	18 7 24.52	2.4346	20 55 43.0	2.163	23	20 0 28.41	2.2575	20 15 29.4	3.604
24	18 9 50.53	2.4322	S. 20° 57' 48.8"	2.031	24	20 2 43.72	2.2529	S. 20° 11' 50.0"	3.707

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	D.iff. for 1 m.
TUESDAY 9.					THURSDAY 11.				
0	<sup>h</sup> 20 <sup>m</sup> 2 43.72	2.2529	S. 20° 11' 50.0"	3.707	0	<sup>h</sup> 21 <sup>m</sup> 45 27.95	2.0321	S. 15° 30' 46.5"	7.687
1	20 4 58.75	2.2482	20 8 4.4	3.810	1	21 47 29.75	2.0279	15 23 3.4	7.750
2	20 7 13.51	2.2436	20 4 12.8	3.912	2	21 49 31.30	2.0238	15 15 16.5	7.812
3	20 9 27.99	2.2389	20 0 15.1	4.013	3	21 51 32.61	2.0197	15 7 25.9	7.874
4	20 11 42.18	2.2342	19 56 11.3	4.113	4	21 53 33.67	2.0157	14 59 31.6	7.935
5	20 13 56.09	2.2294	19 52 1.6	4.211	5	21 55 34.49	2.0117	14 51 33.7	7.995
6	20 16 9.71	2.2247	19 47 46.0	4.309	6	21 57 35.08	2.0077	14 43 32.2	8.054
7	20 18 23.05	2.2200	19 43 24.5	4.407	7	21 59 35.43	2.0038	14 35 27.2	8.113
8	20 20 36.11	2.2153	19 38 57.1	4.503	8	22 1 35.54	2.0000	14 27 18.6	8.171
9	20 22 48.88	2.2105	19 34 24.0	4.599	9	22 3 35.42	1.9962	14 19 6.6	8.228
10	20 25 1.37	2.2058	19 29 45.2	4.694	10	22 5 35.08	1.9924	14 10 51.2	8.285
11	20 27 13.57	2.2010	19 25 0.7	4.788	11	22 7 34.51	1.9886	14 2 32.4	8.341
12	20 29 25.49	2.1962	19 20 10.6	4.881	12	22 9 33.71	1.9849	13 54 10.3	8.396
13	20 31 37.12	2.1914	19 15 14.9	4.974	13	22 11 32.69	1.9812	13 45 44.9	8.450
14	20 33 48.46	2.1867	19 10 13.7	5.065	14	22 13 31.45	1.9775	13 37 16.3	8.504
15	20 35 59.52	2.1819	19 5 7.1	5.156	15	22 15 29.99	1.9739	13 28 44.5	8.557
16	20 38 10.29	2.1772	18 59 55.0	5.246	16	22 17 28.32	1.9703	13 20 9.5	8.609
17	20 40 20.78	2.1724	18 54 37.5	5.335	17	22 19 26.43	1.9668	13 11 31.4	8.660
18	20 42 30.98	2.1677	18 49 14.8	5.423	18	22 21 24.33	1.9633	13 2 50.3	8.711
19	20 44 40.90	2.1629	18 43 46.8	5.511	19	22 23 22.03	1.9599	12 54 6.2	8.761
20	20 46 50.53	2.1582	18 38 13.5	5.597	20	22 25 19.52	1.9565	12 45 19.0	8.810
21	20 48 59.88	2.1534	18 32 35.1	5.683	21	22 27 16.81	1.9532	12 36 28.9	8.859
22	20 51 8.94	2.1487	18 26 51.6	5.768	22	22 29 13.90	1.9498	12 27 35.9	8.907
23	20 53 17.72	2.1439	S. 18 21 3.0	5.852	23	22 31 10.79	1.9465	S. 12 18 40.0	8.955
WEDNESDAY 10.					FRIDAY 12.				
0	20 55 26.21	2.1392	S. 18 15 9.4	5.935	0	22 33 7.48	1.9433	S. 12 9 41.3	9.002
1	20 57 34.42	2.1346	18 9 10.9	6.017	1	22 35 3.98	1.9402	12 0 39.8	9.048
2	20 59 42.36	2.1299	18 3 7.4	6.098	2	22 37 0.30	1.9370	11 51 35.6	9.093
3	21 1 50.01	2.1252	17 56 59.0	6.179	3	22 38 56.43	1.9339	11 42 28.7	9.138
4	21 3 57.38	2.1206	17 50 45.9	6.259	4	22 40 52.37	1.9308	11 33 19.1	9.182
5	21 6 4.47	2.1159	17 44 28.0	6.338	5	22 42 48.13	1.9278	11 24 6.9	9.225
6	21 8 11.29	2.1113	17 38 5.3	6.416	6	22 44 43.71	1.9249	11 14 52.1	9.268
7	21 10 17.83	2.1067	17 31 37.9	6.494	7	22 46 39.12	1.9220	11 5 34.8	9.310
8	21 12 24.09	2.1021	17 25 6.0	6.570	8	22 48 34.35	1.9191	10 56 14.9	9.351
9	21 14 30.08	2.0976	17 18 29.5	6.646	9	22 50 29.41	1.9163	10 46 52.6	9.392
10	21 16 35.80	2.0930	17 11 48.5	6.721	10	22 52 24.31	1.9135	10 37 27.9	9.432
11	21 18 41.25	2.0885	17 5 3.0	6.795	11	22 54 19.04	1.9108	10 28 0.8	9.472
12	21 20 46.42	2.0840	16 58 13.1	6.868	12	22 56 13.61	1.9081	10 18 31.3	9.510
13	21 22 51.32	2.0795	16 51 18.8	6.941	13	22 58 8.02	1.9055	10 8 59.5	9.548
14	21 24 55.96	2.0751	16 44 20.2	7.012	14	23 0 2.27	1.9030	9 59 25.5	9.586
15	21 27 0.33	2.0707	16 37 17.3	7.083	15	23 1 56.37	1.9005	9 49 49.2	9.623
16	21 29 4.44	2.0662	16 30 10.2	7.153	16	23 3 50.33	1.8980	9 40 10.7	9.659
17	21 31 8.28	2.0618	16 22 58.9	7.223	17	23 5 44.14	1.8956	9 30 30.1	9.695
18	21 33 11.86	2.0575	16 15 43.4	7.291	18	23 7 37.80	1.8932	9 20 47.3	9.730
19	21 35 15.18	2.0532	16 8 23.9	7.359	19	23 9 31.32	1.8908	9 11 2.4	9.765
20	21 37 18.24	2.0489	16 1 0.3	7.426	20	23 11 24.70	1.8885	9 1 15.5	9.799
21	21 39 21.05	2.0447	15 53 32.7	7.493	21	23 13 17.95	1.8863	8 51 26.6	9.832
22	21 41 23.60	2.0405	15 46 1.2	7.558	22	23 15 11.06	1.8841	8 41 35.7	9.864
23	21 43 25.90	2.0363	15 38 25.8	7.623	23	23 17 4.04	1.8820	8 31 42.9	9.896
24	21 45 27.95	2.0321	S. 15 30 46.5	7.687	24	23 18 56.90	1.8799	S. 8 21 48.2	9.928

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 13.					MONDAY 15.				
0	<sup>h</sup> 23 <sup>m</sup> 18 <sup>s</sup> 56.90	1.8799	S. 8° 21' 48.2"	9.928	0	<sup>h</sup> 0 47 <sup>m</sup> 45.37	1.8401	S. 0° 0' 24.4"	10.738
1	23 20 49.63	1.8779	8 11 51.6	9.939	1	0 49 35.79	1.8405	N. 0 10 19.9	10.740
2	23 22 42.25	1.8759	8 1 53.1	9.989	2	0 51 26.23	1.8410	0 21 4.4	10.742
3	23 24 34.75	1.8740	7 51 52.9	10.018	3	0 53 16.70	1.8415	0 31 49.0	10.743
4	23 26 27.13	1.8721	7 41 51.0	10.048	4	0 55 7.21	1.8421	0 42 33.6	10.744
5	23 28 19.40	1.8703	7 31 47.4	10.074	5	0 56 57.75	1.8427	0 53 18.2	10.744
6	23 30 11.57	1.8685	7 21 42.1	10.102	6	0 58 48.33	1.8434	1 4 2.9	10.743
7	23 32 3.63	1.8668	7 11 35.1	10.130	7	1 0 38.95	1.8441	1 14 47.5	10.742
8	23 33 55.58	1.8651	7 1 26.5	10.157	8	1 2 29.62	1.8449	1 25 31.9	10.740
9	23 35 47.44	1.8635	6 51 16.3	10.183	9	1 4 20.33	1.8457	1 36 16.2	10.738
10	23 37 39.20	1.8619	6 41 4.6	10.208	10	1 6 11.10	1.8466	1 47 0.4	10.735
11	23 39 30.87	1.8604	6 30 51.3	10.233	11	1 8 1.92	1.8475	1 57 44.4	10.731
12	23 41 22.45	1.8589	6 20 36.6	10.257	12	1 9 52.80	1.8485	2 8 28.1	10.727
13	23 43 13.94	1.8575	6 10 20.4	10.281	13	1 11 43.74	1.8495	2 19 11.5	10.722
14	23 45 5.35	1.8561	6 0 2.9	10.304	14	1 13 34.74	1.8506	2 29 54.7	10.716
15	23 46 56.68	1.8548	5 49 44.0	10.327	15	1 15 25.81	1.8517	2 40 37.5	10.710
16	23 48 47.93	1.8535	5 39 23.7	10.348	16	1 17 16.94	1.8529	2 51 13.9	10.703
17	23 50 39.10	1.8523	5 29 2.2	10.369	17	1 19 8.15	1.8541	3 2 1.8	10.695
18	23 52 30.20	1.8511	5 18 39.4	10.390	18	1 20 59.43	1.8554	3 12 43.3	10.687
19	23 54 21.23	1.8500	5 8 15.4	10.410	19	1 22 50.79	1.8567	3 23 24.3	10.678
20	23 56 12.20	1.8489	4 57 50.2	10.430	20	1 24 42.23	1.8580	3 34 4.7	10.668
21	23 58 3.10	1.8479	4 47 23.8	10.449	21	1 26 33.75	1.8594	3 44 44.5	10.658
22	23 59 53.95	1.8470	4 36 56.3	10.467	22	1 28 25.36	1.8609	3 55 23.7	10.647
23	0 1 44.74	1.8461	S. 4 26 27.7	10.485	23	1 30 17.06	1.8624	N. 4 6 2.2	10.636
SUNDAY 14.					TUESDAY 16.				
0	0 3 35.48	1.8452	S. 4 15 58.1	10.502	0	1 32 8.85	1.8640	N. 4 16 40.0	10.624
1	0 5 26.17	1.8444	4 5 27.5	10.518	1	1 34 0.74	1.8656	4 27 17.1	10.619
2	0 7 16.81	1.8437	3 54 55.9	10.534	2	1 35 52.72	1.8672	4 37 53.4	10.598
3	0 9 7.41	1.8430	3 44 23.4	10.550	3	1 37 44.80	1.8688	4 48 28.8	10.583
4	0 10 57.97	1.8424	3 33 49.9	10.565	4	1 39 36.98	1.8705	4 59 3.4	10.568
5	0 12 48.49	1.8418	3 23 15.5	10.579	5	1 41 29.27	1.8723	5 9 37.1	10.553
6	0 14 38.98	1.8412	3 12 40.4	10.593	6	1 43 21.66	1.8741	5 20 9.8	10.537
7	0 16 29.43	1.8407	3 2 4.5	10.606	7	1 45 14.16	1.8760	5 30 41.5	10.521
8	0 18 19.86	1.8402	2 51 27.7	10.618	8	1 47 6.78	1.8780	5 41 12.3	10.503
9	0 20 10.26	1.8398	2 40 50.2	10.630	9	1 48 59.52	1.8800	5 51 42.0	10.484
10	0 22 0.64	1.8395	2 30 12.1	10.641	10	1 50 52.38	1.8820	6 2 10.4	10.465
11	0 23 51.00	1.8392	2 19 33.3	10.653	11	1 52 45.36	1.8841	6 12 37.7	10.446
12	0 25 41.35	1.8390	2 8 53.9	10.662	12	1 54 38.47	1.8862	6 23 3.9	10.426
13	0 27 31.68	1.8388	1 58 13.9	10.672	13	1 56 31.70	1.8883	6 33 28.9	10.405
14	0 29 22.00	1.8387	1 47 33.3	10.681	14	1 58 25.06	1.8905	6 43 52.5	10.383
15	0 31 12.32	1.8386	1 36 52.2	10.689	15	2 0 18.56	1.8928	6 54 14.8	10.361
16	0 33 2.63	1.8386	1 26 10.6	10.697	16	2 2 12.19	1.8950	7 4 35.8	10.337
17	0 34 52.94	1.8386	1 15 28.5	10.705	17	2 4 5.96	1.8973	7 14 55.4	10.313
18	0 36 43.26	1.8387	1 4 46.0	10.712	18	2 5 59.87	1.8997	7 25 13.4	10.289
19	0 38 33.58	1.8388	0 54 3.1	10.718	19	2 7 53.92	1.9021	7 35 30.0	10.264
20	0 40 23.91	1.8390	0 43 19.9	10.723	20	2 9 48.12	1.9045	7 45 45.1	10.238
21	0 42 14.25	1.8392	0 32 36.4	10.728	21	2 11 42.47	1.9070	7 55 58.6	10.211
22	0 44 4.61	1.8394	0 21 52.6	10.732	22	2 13 36.96	1.9095	8 6 10.4	10.183
23	0 45 54.98	1.8397	0 11 8.6	10.735	23	2 15 31.61	1.9121	8 16 20.5	10.155
24	0 47 45.37	1.8401	S. 0 0 24.4	10.738	24	2 17 26.41	1.9147	N. 8 26 29.0	10.126

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 17.					FRIDAY 19.				
0	2 17 26.41	1.9147	N. 8° 26' 29.0"	10.196	0	3 53 0.80	2.0781	N. 15° 44' 14.9"	7.799
1	2 19 21.37	1.9173	8 36 35.7	10.097	1	3 55 5.60	2.0890	15 52 0.8	7.730
2	2 21 16.49	1.9200	8 46 40.6	10.066	2	3 57 10.64	2.0960	15 59 42.5	7.660
3	2 23 11.77	1.9228	8 56 43.6	10.035	3	3 59 15.92	2.0999	16 7 20.0	7.589
4	2 25 7.22	1.9256	9 6 44.8	10.003	4	4 1 21.43	2.0939	16 14 53.2	7.517
5	2 27 2.84	1.9284	9 16 44.0	9.970	5	4 3 27.18	2.0978	16 22 22.1	7.445
6	2 28 58.63	1.9312	9 26 41.2	9.936	6	4 5 33.16	2.1018	16 29 46.6	7.373
7	2 30 54.59	1.9341	9 36 36.4	9.902	7	4 7 39.38	2.1058	16 37 6.7	7.298
8	2 32 50.72	1.9370	9 46 29.5	9.867	8	4 9 45.85	2.1098	16 44 22.4	7.223
9	2 34 47.03	1.9399	9 56 20.5	9.832	9	4 11 52.55	2.1137	16 51 33.5	7.147
10	2 36 43.51	1.9429	10 6 9.3	9.796	10	4 13 59.49	2.1177	16 58 40.0	7.070
11	2 38 40.18	1.9460	10 15 55.8	9.757	11	4 16 6.67	2.1216	17 5 41.9	6.993
12	2 40 37.03	1.9491	10 25 40.1	9.719	12	4 18 14.08	2.1256	17 12 39.1	6.914
13	2 42 34.07	1.9522	10 35 22.1	9.680	13	4 20 21.73	2.1296	17 19 31.6	6.835
14	2 44 31.29	1.9553	10 45 1.7	9.640	14	4 22 29.63	2.1336	17 26 19.3	6.754
15	2 46 28.70	1.9584	10 54 38.9	9.600	15	4 24 37.76	2.1375	17 33 2.1	6.673
16	2 48 26.30	1.9616	11 4 13.7	9.559	16	4 26 46.13	2.1414	17 39 40.1	6.591
17	2 50 24.10	1.9648	11 13 46.0	9.517	17	4 28 54.73	2.1453	17 46 13.2	6.509
18	2 52 22.09	1.9682	11 23 15.7	9.473	18	4 31 3.57	2.1493	17 52 41.2	6.425
19	2 54 20.28	1.9715	11 32 42.8	9.429	19	4 33 12.65	2.1532	17 59 4.2	6.341
20	2 56 18.67	1.9748	11 42 7.2	9.385	20	4 35 21.96	2.1572	18 5 22.1	6.256
21	2 58 17.26	1.9782	11 51 29.0	9.340	21	4 37 31.51	2.1611	18 11 34.9	6.170
22	3 0 16.05	1.9816	12 0 48.0	9.294	22	4 39 41.29	2.1650	18 17 42.5	6.083
23	3 2 15.05	1.9850	N. 12° 10' 4.2"	9.247	23	4 41 51.30	2.1688	N. 18° 23' 44.9"	5.996
THURSDAY 18.					SATURDAY 20.				
0	3 4 14.25	1.9884	N. 12° 19' 17.6"	9.199	0	4 44 1.55	2.1727	N. 18° 29' 42.0"	5.907
1	3 6 13.66	1.9919	12 28 28.1	9.150	1	4 46 12.03	2.1766	18 35 33.7	5.818
2	3 8 13.28	1.9954	12 37 35.6	9.101	2	4 48 22.74	2.1805	18 41 20.1	5.728
3	3 10 13.11	1.9990	12 46 40.2	9.051	3	4 50 33.68	2.1843	18 47 1.1	5.637
4	3 12 13.16	2.0025	12 55 41.7	9.000	4	4 52 44.85	2.1881	18 52 36.6	5.545
5	3 14 13.42	2.0061	13 4 40.1	8.948	5	4 54 56.25	2.1918	18 58 6.6	5.453
6	3 16 13.89	2.0097	13 13 35.4	8.895	6	4 57 7.87	2.1956	19 3 31.0	5.360
7	3 18 14.58	2.0133	13 22 27.5	8.841	7	4 59 19.72	2.1993	19 8 49.8	5.267
8	3 20 15.49	2.0170	13 31 16.3	8.786	8	5 1 31.79	2.2031	19 14 3.0	5.173
9	3 22 16.62	2.0207	13 40 1.8	8.731	9	5 3 44.08	2.2068	19 19 10.4	5.076
10	3 24 17.97	2.0244	13 48 44.0	8.675	10	5 5 56.60	2.2105	19 24 12.1	4.980
11	3 26 19.55	2.0282	13 57 22.8	8.618	11	5 8 9.34	2.2141	19 29 8.0	4.883
12	3 28 21.35	2.0319	14 5 58.2	8.560	12	5 10 22.29	2.2177	19 33 58.0	4.785
13	3 30 23.38	2.0357	14 14 30.1	8.502	13	5 12 35.45	2.2212	19 38 42.1	4.687
14	3 32 25.63	2.0394	14 22 58.4	8.442	14	5 14 48.83	2.2248	19 43 20.4	4.588
15	3 34 28.11	2.0432	14 31 23.1	8.382	15	5 17 2.42	2.2283	19 47 52.7	4.488
16	3 36 30.81	2.0470	14 39 44.2	8.320	16	5 19 16.23	2.2318	19 52 18.9	4.387
17	3 38 33.74	2.0508	14 48 1.5	8.258	17	5 21 30.24	2.2353	19 56 39.0	4.285
18	3 40 36.91	2.0547	14 56 15.1	8.195	18	5 23 44.46	2.2387	20 0 53.1	4.183
19	3 42 40.31	2.0586	15 4 24.9	8.131	19	5 25 58.88	2.2421	20 5 1.0	4.080
20	3 44 43.94	2.0624	15 12 30.8	8.066	20	5 28 13.51	2.2454	20 9 2.7	3.976
21	3 46 47.80	2.0663	15 20 32.8	8.001	21	5 30 28.33	2.2487	20 12 58.2	3.872
22	3 48 51.90	2.0703	15 28 30.9	7.934	22	5 32 43.35	2.2520	20 16 47.4	3.767
23	3 50 56.23	2.0742	15 36 24.9	7.867	23	5 34 58.56	2.2552	20 20 30.3	3.662
24	3 53 0.80	2.0781	N. 15° 44' 14.9"	7.799	24	5 37 13.97	2.2584	N. 20° 24' 6.9"	3.556



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 21.					TUESDAY 23.				
0	5 37 13.97	2.2584	N.20 24' 6.9"	3.556	0	7 28 21.44	2.3499	N.21° 3' 6.1"	2.060
1	5 39 29.57	2.2615	20 27 37.1	3.449	1	7 30 42.45	2.3503	21 0 58.8	2.163
2	5 41 45.35	2.2646	20 31 0.8	3.342	2	7 33 3.48	2.3507	20 58 44.2	2.305
3	5 44 1.32	2.2677	20 34 18.1	3.234	3	7 35 24.53	2.3511	20 56 22.3	2.427
4	5 46 17.47	2.2708	20 37 28.9	3.126	4	7 37 45.61	2.3514	20 53 53.0	2.550
5	5 48 33.81	2.2738	20 40 33.2	3.017	5	7 40 6.70	2.3516	20 51 16.4	2.672
6	5 50 50.32	2.2767	20 43 30.9	2.907	6	7 42 27.80	2.3517	20 48 32.4	2.794
7	5 53 7.00	2.2795	20 46 22.0	2.796	7	7 44 48.91	2.3518	20 45 41.1	2.915
8	5 55 23.86	2.2824	20 49 6.4	2.685	8	7 47 10.02	2.3519	20 42 42.6	3.037
9	5 57 40.89	2.2852	20 51 44.2	2.574	9	7 49 31.14	2.3519	20 39 36.8	3.158
10	5 59 58.08	2.2879	20 54 15.3	2.462	10	7 51 52.25	2.3518	20 36 23.7	3.279
11	6 2 15.43	2.2906	20 56 39.6	2.349	11	7 54 13.35	2.3517	20 33 3.3	3.400
12	6 4 32.95	2.2932	20 58 57.2	2.236	12	7 56 34.45	2.3515	20 29 35.7	3.521
13	6 6 50.62	2.2958	21 1 8.0	2.123	13	7 58 55.54	2.3513	20 26 0.8	3.642
14	6 9 8.44	2.2983	21 3 12.0	2.009	14	8 1 16.61	2.3510	20 22 18.7	3.763
15	6 11 26.42	2.3008	21 5 9.1	1.894	15	8 3 37.66	2.3507	20 18 29.4	3.883
16	6 13 44.54	2.3032	21 6 59.3	1.779	16	8 5 58.70	2.3503	20 14 32.8	4.003
17	6 16 2.81	2.3056	21 8 42.6	1.664	17	8 8 19.71	2.3499	20 10 29.0	4.123
18	6 18 21.21	2.3079	21 10 19.0	1.548	18	8 10 40.69	2.3494	20 6 18.1	4.242
19	6 20 39.75	2.3102	21 11 48.4	1.432	19	8 13 1.64	2.3489	20 2 0.0	4.361
20	6 22 58.43	2.3124	21 13 10.8	1.315	20	8 15 22.56	2.3483	19 57 34.8	4.480
21	6 25 17.24	2.3146	21 14 26.2	1.198	21	8 17 43.44	2.3477	19 53 2.4	4.598
22	6 27 36.18	2.3167	21 15 34.6	1.081	22	8 20 4.29	2.3470	19 48 23.0	4.716
23	6 29 55.24	2.3187	N.21 16 35.9	0.963	23	8 22 25.09	2.3463	N.19 43 36.5	4.834
MONDAY 22.					WEDNESDAY 24.				
0	6 32 14.42	2.3207	N.21 17 30.1	0.845	0	8 24 45.85	2.3456	N.19 38 42.9	4.952
1	6 34 33.72	2.3226	21 18 17.2	0.726	1	8 27 6.56	2.3448	19 33 42.3	5.069
2	6 36 53.13	2.3244	21 18 57.2	0.607	2	8 29 27.23	2.3440	19 28 34.6	5.186
3	6 39 12.65	2.3262	21 19 30.0	0.488	3	8 31 47.84	2.3431	19 23 20.0	5.302
4	6 41 32.28	2.3279	21 19 55.7	0.369	4	8 34 8.40	2.3422	19 17 58.4	5.418
5	6 43 52.01	2.3296	21 20 14.2	0.249	5	8 36 28.90	2.3413	19 12 29.8	5.533
6	6 46 11.83	2.3312	21 20 25.6	0.129	6	8 38 49.35	2.3403	19 6 54.4	5.648
7	6 48 31.75	2.3328	21 20 29.7	0.008	7	8 41 9.74	2.3393	19 1 12.1	5.763
8	6 50 51.76	2.3343	21 20 26.6	0.119	8	8 43 30.06	2.3382	18 55 22.9	5.877
9	6 53 11.86	2.3357	21 20 16.3	0.233	9	8 45 50.32	2.3371	18 49 26.9	5.990
10	6 55 32.05	2.3371	21 19 58.7	0.354	10	8 48 10.51	2.3360	18 43 24.1	6.103
11	6 57 52.32	2.3384	21 19 33.8	0.475	11	8 50 30.63	2.3348	18 37 14.5	6.216
12	7 0 12.66	2.3396	21 19 1.7	0.596	12	8 52 50.68	2.3336	18 30 58.2	6.328
13	7 2 33.07	2.3408	21 18 22.3	0.718	13	8 55 10.66	2.3323	18 24 35.2	6.439
14	7 4 53.56	2.3420	21 17 35.6	0.839	14	8 57 30.56	2.3311	18 18 5.5	6.550
15	7 7 14.12	2.3431	21 16 41.6	0.961	15	8 59 50.38	2.3298	18 11 29.2	6.660
16	7 9 34.73	2.3441	21 15 40.3	1.083	16	9 2 10.13	2.3285	18 4 46.3	6.769
17	7 11 55.40	2.3450	21 14 31.7	1.205	17	9 4 29.80	2.3272	17 57 56.9	6.878
18	7 14 16.13	2.3459	21 13 15.7	1.327	18	9 6 49.39	2.3258	17 51 0.9	6.987
19	7 16 36.91	2.3467	21 11 52.4	1.449	19	9 9 8.90	2.3244	17 43 58.4	7.095
20	7 18 57.73	2.3475	21 10 21.8	1.571	20	9 11 28.32	2.3230	17 36 49.5	7.202
21	7 21 18.60	2.3482	21 8 43.9	1.693	21	9 13 47.66	2.3216	17 29 34.1	7.309
22	7 23 39.51	2.3488	21 6 58.6	1.815	22	9 16 6.91	2.3202	17 22 12.4	7.415
23	7 26 0.46	2.3494	21 5 6.0	1.938	23	9 18 26.07	2.3187	17 14 44.4	7.520
24	7 28 21.44	2.3499	N.21 3 6.1	2.060	24	9 20 45.15	2.3172	N.17 7 10.0	7.625

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 25.					SATURDAY 27.				
0	9 20 45.15	2.3172	N. 17° 7' 10.0"	7.625	0	11 10 15.03	2.2300	N. 9° 15' 48.2"	11.668
1	9 23 4.14	2.3157	16 59 29.3	7.729	1	11 12 30.00	2.2401	9 4 6.3	11.738
2	9 25 23.03	2.3142	16 51 42.5	7.832	2	11 14 44.92	2.2462	8 52 20.9	11.787
3	9 27 41.83	2.3127	16 43 49.5	7.935	3	11 16 59.78	2.2473	8 40 32.0	11.844
4	9 30 0.55	2.3112	16 35 50.3	8.037	4	11 19 14.60	2.2465	8 28 39.6	11.901
5	9 32 19.18	2.3097	16 27 45.1	8.138	5	11 21 29.37	2.2458	8 16 43.8	11.957
6	9 34 37.71	2.3081	16 19 33.8	8.238	6	11 23 44.10	2.2451	8 4 44.7	12.012
7	9 36 56.15	2.3065	16 11 16.5	8.338	7	11 25 58.78	2.2444	7 52 42.4	12.066
8	9 39 14.49	2.3050	16 2 53.3	8.436	8	11 28 13.43	2.2438	7 40 36.8	12.118
9	9 41 32.74	2.3034	15 54 24.2	8.534	9	11 30 28.04	2.2432	7 28 28.1	12.170
10	9 43 50.90	2.3019	15 45 49.2	8.631	10	11 32 42.62	2.2427	7 16 16.4	12.220
11	9 46 8.96	2.3003	15 37 8.4	8.728	11	11 34 57.16	2.2422	7 4 1.7	12.269
12	9 48 26.93	2.2987	15 28 21.8	8.824	12	11 37 11.68	2.2417	6 51 44.1	12.316
13	9 50 44.80	2.2971	15 19 29.5	8.919	13	11 39 26.17	2.2413	6 39 23.7	12.363
14	9 53 2.58	2.2955	15 10 31.5	9.013	14	11 41 40.63	2.2409	6 27 0.5	12.409
15	9 55 20.26	2.2939	15 1 27.9	9.106	15	11 43 55.07	2.2406	6 14 34.6	12.454
16	9 57 37.85	2.2924	14 52 18.8	9.198	16	11 46 9.50	2.2403	6 2 6.0	12.497
17	9 59 55.34	2.2908	14 43 4.1	9.290	17	11 48 23.91	2.2400	5 49 34.9	12.539
18	10 2 12.74	2.2893	14 33 44.0	9.381	18	11 50 38.30	2.2398	5 37 1.3	12.579
19	10 4 30.05	2.2877	14 24 18.5	9.471	19	11 52 52.68	2.2397	5 24 25.3	12.619
20	10 6 47.26	2.2862	14 14 47.5	9.560	20	11 55 7.06	2.2395	5 11 47.0	12.658
21	10 9 4.38	2.2846	14 5 11.2	9.648	21	11 57 21.43	2.2394	4 59 6.4	12.695
22	10 11 21.41	2.2831	13 55 29.7	9.735	22	11 59 35.79	2.2394	4 46 23.6	12.731
23	10 13 38.35	2.2815	N. 13° 45' 43.0"	9.822	23	12 1 50.15	2.2394	N. 4° 33' 38.7"	12.765
FRIDAY 26.					SUNDAY 28.				
0	10 15 55.19	2.2800	N. 13° 35' 51.1"	9.907	0	12 4 4.52	2.2395	N. 4° 20' 51.8"	12.798
1	10 18 11.94	2.2785	13 25 54.1	9.992	1	12 6 18.89	2.2396	4 8 2.9	12.831
2	10 20 28.61	2.2770	13 15 52.1	10.075	2	12 8 33.27	2.2398	3 55 12.1	12.862
3	10 22 45.19	2.2756	13 5 45.1	10.158	3	12 10 47.66	2.2400	3 42 19.5	12.891
4	10 25 1.68	2.2741	12 55 33.2	10.240	4	12 13 2.07	2.2402	3 29 25.2	12.919
5	10 27 18.08	2.2727	12 45 16.4	10.321	5	12 15 16.49	2.2405	3 16 29.2	12.947
6	10 29 34.40	2.2712	12 34 54.7	10.400	6	12 17 30.93	2.2409	3 3 31.6	12.973
7	10 31 50.63	2.2698	12 24 28.3	10.479	7	12 19 45.39	2.2413	2 50 32.5	12.997
8	10 34 6.78	2.2684	12 13 57.2	10.557	8	12 21 59.88	2.2417	2 37 32.0	13.020
9	10 36 22.84	2.2671	12 3 21.5	10.634	9	12 24 14.40	2.2422	2 24 30.1	13.042
10	10 38 38.83	2.2658	11 52 41.1	10.710	10	12 26 28.95	2.2427	2 11 27.0	13.062
11	10 40 54.74	2.2645	11 41 56.2	10.786	11	12 28 43.53	2.2433	1 58 22.7	13.081
12	10 43 10.57	2.2632	11 31 6.8	10.860	12	12 30 58.15	2.2440	1 45 17.3	13.099
13	10 45 26.32	2.2619	11 20 13.0	10.933	13	12 33 12.81	2.2447	1 32 10.8	13.116
14	10 47 42.00	2.2607	11 9 14.9	11.005	14	12 35 27.52	2.2454	1 19 3.4	13.131
15	10 49 57.61	2.2595	10 58 12.5	11.075	15	12 37 42.27	2.2462	1 5 55.1	13.145
16	10 52 13.14	2.2583	10 47 5.9	11.145	16	12 39 57.07	2.2470	0 52 46.0	13.158
17	10 54 28.60	2.2571	10 35 55.1	11.214	17	12 42 11.92	2.2479	0 39 36.2	13.169
18	10 56 43.99	2.2560	10 24 40.2	11.281	18	12 44 26.82	2.2488	0 26 25.7	13.179
19	10 58 59.32	2.2549	10 13 21.3	11.348	19	12 46 41.78	2.2498	0 13 14.7	13.187
20	11 1 14.58	2.2538	10 1 58.4	11.414	20	12 48 56.80	2.2509	N. 0° 0' 3.3"	13.194
21	11 3 29.78	2.2528	9 50 31.6	11.479	21	12 51 11.89	2.2520	S. 0° 13' 8.5"	13.200
22	11 5 44.92	2.2518	9 39 0.9	11.543	22	12 53 27.04	2.2531	0 26 20.7	13.205
23	11 8 0.00	2.2509	9 27 20.4	11.606	23	12 55 42.26	2.2543	0 39 33.1	13.208
24	11 10 15.03	2.2500	N. 9° 15' 48.2"	11.668	24	12 57 57.55	2.2555	S. 0° 52' 45.6"	13.209

GREENWICH MEAN TIME.

THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 29.					TUESDAY 30.				
0	12 57 57.55	2.9555	S. 0° 52' 45.6"	13.909	0	13 52 33.15	2.9980	S. 6° 6' 44.5"	12.816
1	13 0 12.92	2.9568	1 5 58.2	13.909	1	13 54 51.10	2.3003	6 19 32.5	12.792
2	13 2 28.36	2.9581	1 19 10.7	13.908	2	13 57 9.19	2.3026	6 32 18.3	12.746
3	13 4 43.88	2.9594	1 32 23.1	13.905	3	13 59 27.42	2.3050	6 45 1.9	12.708
4	13 6 59.49	2.9608	1 45 35.3	13.901	4	14 1 45.79	2.3074	6 57 43.2	12.669
5	13 9 15.18	2.9622	1 58 47.2	13.196	5	14 4 4.30	2.3098	7 10 22.1	12.628
6	13 11 30.96	2.9637	2 11 58.8	13.189	6	14 6 22.96	2.3122	7 22 58.6	12.586
7	13 13 46.83	2.9653	2 25 9.9	13.181	7	14 8 41.77	2.3147	7 35 32.5	12.542
8	13 16 2.80	2.9669	2 38 20.5	13.171	8	14 11 0.72	2.3172	7 48 3.7	12.497
9	13 18 18.87	2.9686	2 51 30.4	13.159	9	14 13 19.82	2.3197	8 0 32.1	12.450
10	13 20 35.03	2.9702	3 4 39.6	13.146	10	14 15 39.08	2.3222	8 12 57.7	12.402
11	13 22 51.29	2.9719	3 17 48.0	13.133	11	14 17 58.49	2.3248	8 25 20.4	12.353
12	13 25 7.66	2.9737	3 30 55.5	13.118	12	14 20 18.05	2.3274	8 37 40.0	12.302
13	13 27 24.13	2.9755	3 44 2.1	13.101	13	14 22 37.77	2.3300	8 49 56.5	12.249
14	13 29 40.72	2.9774	3 57 7.6	13.082	14	14 24 57.65	2.3326	9 2 9.9	12.195
15	13 31 57.42	2.9793	4 10 11.9	13.062	15	14 27 17.68	2.3353	9 14 20.0	12.139
16	13 34 14.23	2.9812	4 23 15.0	13.041	16	14 29 37.88	2.3380	9 26 26.6	12.082
17	13 36 31.16	2.9832	4 36 16.8	13.018	17	14 31 58.24	2.3407	9 38 29.8	12.023
18	13 38 48.21	2.9852	4 49 17.1	12.994	18	14 34 18.76	2.3434	9 50 29.4	11.963
19	13 41 5.38	2.9873	5 2 15.9	12.968	19	14 36 39.44	2.3461	10 2 25.4	11.902
20	13 43 22.68	2.9893	5 15 13.2	12.941	20	14 39 0.29	2.3488	10 14 17.7	11.839
21	13 45 40.10	2.9914	5 28 8.8	12.912	21	14 41 21.30	2.3516	10 26 6.2	11.775
22	13 47 57.65	2.9936	5 41 2.6	12.881	22	14 43 42.48	2.3544	10 37 50.7	11.709
23	13 50 15.33	2.9958	5 53 54.5	12.849	23	14 46 3.83	2.3572	10 49 31.2	11.642
24	13 52 33.15	2.9980	S. 6° 6' 44.5"	12.816	24	14 48 25.34	2.3600	S. 11° 1' 7.7"	11.573

PHASES OF THE MOON.

● New Moon, . . . . .	d	h	m
☾ First Quarter, . . . . .	3	11	35.5
○ Full Moon, . . . . .	10	14	55.4
☾ Last Quarter, . . . . .	18	19	17.9
	26	6	14.6

☾ Perigee, . . . . .	d	h
☾ Apogee, . . . . .	2	5.5
☾ Perigee, . . . . .	14	8.8
	30	9.2

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
1	Pollux W.	72° 22' 49"	2097	74° 13' 53"	2089	76° 5' 9"	2083	77° 56' 35"	2077
	Regulus W.	36 19 17	2060	38 11 18	2053	40 3 30	2047	41 55 51	2041
	SUN E.	35 12 30	2408	33 29 7	2407	31 45 42	2407	30 2 17	2408
5	SUN W.	21 21 32	2614	23 0 8	2616	24 38 41	2621	26 17 8	2627
	Fomalhaut E.	89 36 21	2417	87 53 11	2433	86 10 23	2449	84 27 58	2466
	α Pegasi E.	105 2 21	2579	103 22 57	2587	101 43 44	2597	100 4 45	2609
6	SUN W.	34 26 18	2686	36 3 17	2701	37 39 56	2717	39 16 13	2734
	Fomalhaut E.	76 2 11	2563	74 22 25	2584	72 43 8	2607	71 4 22	2630
	α Pegasi E.	91 54 13	2681	90 17 8	2699	88 40 27	2717	87 4 10	2737
7	SUN W.	47 11 58	2823	48 45 56	2842	50 19 29	2861	51 52 38	2880
	Mars W.	18 1 20	2840	19 34 56	2841	21 8 31	2845	22 42 0	2852
	Saturn W.	16 37 59	2534	18 18 25	2547	19 58 33	2561	21 38 22	2576
	Fomalhaut E.	62 58 47	2760	61 23 26	2788	59 48 42	2817	58 14 36	2848
	α Pegasi E.	79 9 25	2844	77 35 54	2868	76 2 54	2893	74 30 26	2917
8	SUN W.	59 32 17	2976	61 3 0	2995	62 33 19	3014	64 3 15	3032
	Mars W.	30 26 23	2912	31 58 26	2927	33 30 10	2942	35 1 35	2958
	Saturn W.	29 52 4	2657	31 29 41	2675	33 6 54	2692	34 43 44	2709
	Venus W.	15 47 49	2947	17 13 2	2933	18 38 32	2924	20 4 13	2920
	Fomalhaut E.	50 34 25	3090	49 4 37	3058	47 35 36	3099	46 7 25	3143
	α Pegasi E.	66 56 20	3055	65 27 15	3086	63 58 48	3117	62 30 59	3148
9	SUN W.	71 27 11	3194	72 54 52	3141	74 22 12	3158	75 49 12	3174
	Saturn W.	42 42 20	2792	44 16 58	2808	45 51 15	2825	47 25 11	2839
	Mars W.	42 33 40	3038	44 3 6	3054	45 32 12	3069	47 0 59	3084
	Venus W.	27 12 32	3244	28 37 49	3255	30 2 53	3261	31 27 45	3277
	α Pegasi E.	55 21 54	3327	53 58 14	3367	52 35 20	3409	51 13 14	3454
	α Arietis E.	97 4 31	2900	95 32 12	2916	94 0 13	2931	92 28 33	2946
	Jupiter E.	107 8 44	2711	105 32 19	2726	103 56 14	2742	102 20 30	2757
10	SUN W.	82 59 19	3253	84 24 26	3268	85 49 15	3282	87 13 48	3295
	Saturn W.	55 10 3	2919	56 42 7	2926	58 13 54	2939	59 45 24	2950
	Mars W.	54 20 21	3158	55 47 21	3171	57 14 5	3184	58 40 33	3197
	Venus W.	38 28 38	3337	39 52 7	3349	41 15 22	3360	42 38 24	3372
	α Pegasi E.	44 36 3	3717	43 19 34	3781	42 4 12	3850	40 50 1	3924
	α Arietis E.	84 55 1	3021	83 25 14	3034	81 55 44	3049	80 26 32	3063
	Jupiter E.	94 26 45	2829	92 52 55	2843	91 19 23	2855	89 46 7	2868
11	SUN W.	94 12 46	3357	95 35 52	3368	96 58 45	3379	98 21 26	3387
	Saturn W.	67 19 10	3007	68 49 14	3018	70 19 5	3027	71 48 44	3036
	Mars W.	65 49 16	3255	67 14 20	3265	68 39 13	3275	70 3 54	3285
	Venus W.	49 30 22	3426	50 52 9	3435	52 13 46	3444	53 35 13	3453
	α Aquilæ W.	38 25 46	4941	39 23 28	4822	40 22 46	4717	41 23 31	4624
	α Arietis E.	73 4 45	3130	71 37 12	3143	70 9 55	3156	68 42 53	3168
	Jupiter E.	82 3 36	2924	80 31 47	2935	79 0 12	2944	77 28 49	2953
	Aldebaran E.	104 19 14	2905	102 48 17	2975	101 17 33	2985	99 47 1	2993
12	SUN W.	105 12 16	3431	106 33 58	3438	107 55 32	3444	109 16 59	3450
	Saturn W.	79 14 25	3074	80 43 6	3081	82 11 39	3087	83 40 4	3092
	Mars W.	77 4 45	3294	78 28 29	3331	79 52 5	3337	81 15 34	3343
	Venus W.	60 20 9	3489	61 40 45	3497	63 1 13	3502	64 21 35	3507
	α Aquilæ W.	46 45 6	4276	47 52 21	4223	49 0 25	4176	50 9 14	4134

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
1	Pollux	W.	79° 48' 9"	9079	81° 39' 51"	9068	83° 31' 40"	9064	85° 23' 34"	9061
	Regulus	W.	43 48 21	9037	45 40 58	9039	47 33 42	9029	49 26 31	9026
	SUN	E.	28 18 53	9411	26 35 34	9418	24 52 25	9426	23 9 28	9437
5	SUN	W.	27 55 26	9636	29 33 32	9646	31 11 24	9658	32 49 0	9672
	Fomalhaut	E.	82 45 57	9484	81 4 21	9502	79 23 10	9521	77 42 26	9542
	α Pegasi	E.	98 26 2	9621	96 47 36	9635	95 9 28	9649	93 31 40	9665
6	SUN	W.	40 52 8	9751	42 27 40	9768	44 2 50	9786	45 37 36	9805
	Fomalhaut	E.	69 26 8	9654	67 48 26	9679	66 11 18	9705	64 34 45	9732
	α Pegasi	E.	85 28 19	9756	83 52 54	9777	82 17 56	9798	80 43 26	9821
7	SUN	W.	53 25 23	9869	54 57 43	9918	56 29 39	9938	58 1 10	9957
	Mars	W.	24 15 20	9862	25 48 28	9879	27 21 23	9884	28 54 2	9898
	Saturn	W.	23 17 50	9591	24 56 57	9607	26 35 42	9624	28 14 4	9640
	Fomalhaut	E.	56 41 10	9890	55 8 25	9912	53 36 21	9946	52 5 0	9982
	α Pegasi	E.	72 58 29	9943	71 27 5	9971	69 56 16	9998	68 26 1	3026
8	SUN	W.	65 32 48	3059	67 1 57	3069	68 30 44	3088	69 59 8	3105
	Mars	W.	36 32 40	2974	38 3 25	2990	39 33 50	3006	41 3 55	3022
	Saturn	W.	36 20 12	2736	37 56 17	2743	39 32 0	2760	41 7 21	2776
	Venus	W.	21 29 59	3290	22 55 45	3292	24 21 28	3298	25 47 4	3305
	Fomalhaut	E.	44 40 8	3189	43 13 46	3237	41 48 21	3289	40 23 57	3347
	α Pegasi	E.	61 3 48	3182	59 37 17	3216	58 11 27	3252	56 46 19	3288
9	SUN	W.	77 15 52	3191	78 42 12	3207	80 8 13	3223	81 33 55	3238
	Saturn	W.	48 58 48	2855	50 32 5	2869	52 5 3	2884	53 37 42	2898
	Mars	W.	48 29 28	3100	49 57 38	3114	51 25 30	3129	52 53 4	3143
	Venus	W.	32 52 23	3289	34 16 47	3300	35 40 58	3313	37 4 55	3325
	α Pegasi	E.	49 51 59	3501	48 31 36	3550	47 12 7	3602	45 53 35	3658
	α Arietis	E.	90 57 13	2962	89 26 12	2977	87 55 30	2991	86 25 6	3006
	Jupiter	E.	100 45 6	2772	99 10 2	2788	97 35 18	2802	96 0 53	2815
10	SUN	W.	88 38 5	3308	90 2 7	3321	91 25 54	3333	92 49 27	3345
	Saturn	W.	61 16 39	2962	62 47 39	2975	64 18 23	2986	65 48 53	2997
	Mars	W.	60 6 46	3209	61 32 44	3221	62 58 28	3232	64 23 59	3244
	Venus	W.	44 1 13	3363	45 23 49	3394	46 46 12	3405	48 8 23	3415
	α Pegasi	E.	39 37 6	4006	38 25 32	4093	37 15 24	4191	36 6 49	4296
	α Arietis	E.	78 57 37	3077	77 28 59	3091	76 0 38	3104	74 32 33	3118
	Jupiter	E.	88 13 7	2880	86 40 22	2892	85 7 53	2903	83 35 38	2913
11	SUN	W.	99 43 57	3397	101 6 17	3407	102 28 26	3415	103 50 25	3423
	Saturn	W.	73 18 12	3045	74 47 29	3052	76 16 37	3060	77 45 36	3068
	Mars	W.	71 28 23	3294	72 52 42	3301	74 16 52	3309	75 40 53	3317
	Venus	W.	54 56 30	3461	56 17 38	3470	57 38 36	3477	58 59 26	3483
	α Aquilæ	E.	42 25 35	4540	43 28 52	4463	44 33 17	4394	45 38 44	4333
	α Arietis	E.	67 16 6	3181	65 49 34	3193	64 23 17	3206	62 57 15	3218
	Jupiter	E.	75 57 37	2962	74 26 36	2969	72 55 45	2977	71 25 4	2985
	Aldebaran	E.	98 16 40	3092	96 46 30	3010	95 16 30	3018	93 46 40	3025
12	SUN	W.	110 38 19	3456	111 59 32	3461	113 20 40	3465	114 41 43	3471
	Saturn	W.	85 8 23	3097	86 36 36	3101	88 4 44	3105	89 32 47	3110
	Mars	W.	82 38 56	3347	84 2 13	3352	85 25 24	3357	86 48 30	3360
	Venus	W.	65 41 51	3512	67 2 2	3516	68 22 8	3520	69 42 10	3524
	α Aquilæ	W.	51 18 43	4095	52 28 50	4056	53 39 34	4023	54 50 51	3992

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## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
12	$\alpha$ Arietis	E.	61° 31' 27"	3231	60° 5' 54"	3242	58° 40' 35"	3255	57° 15' 31"	3269
	Jupiter	E.	69 54 32	2991	68 24 8	2998	66 53 53	3004	65 23 45	3009
	Aldebaran	E.	92 16 58	3031	90 47 24	3039	89 17 59	3044	87 48 41	3049
13	Saturn	W.	91 0 45	3113	92 28 39	3115	93 56 30	3118	95 24 18	3119
	Mars	W.	88 11 32	3364	89 34 30	3366	90 57 25	3369	92 20 17	3371
	Venus	W.	71 2 8	3596	72 22 3	3599	73 41 55	3531	75 1 45	3533
	$\alpha$ Aquilæ	W.	56 2 38	3963	57 14 54	3937	58 27 36	3913	59 40 43	3890
	$\alpha$ Arietis	E.	50 13 59	3335	48 50 28	3351	47 27 15	3366	46 4 20	3383
	Jupiter	E.	57 54 40	3031	56 25 6	3034	54 55 36	3037	53 26 9	3040
	Aldebaran	E.	80 23 38	3069	78 54 51	3073	77 26 8	3075	75 57 28	3076
14	Mars	W.	99 14 14	3374	100 37 0	3374	101 59 46	3373	103 22 33	3372
	Venus	W.	81 40 38	3534	83 0 25	3534	84 20 12	3532	85 40 1	3530
	$\alpha$ Aquilæ	W.	65 51 44	3793	67 6 53	3778	68 22 18	3763	69 37 59	3748
	Fomalhaut	W.	31 14 45	4052	32 25 33	3975	33 37 37	3906	34 50 49	3847
	$\alpha$ Arietis	E.	39 15 0	3488	37 54 23	3515	36 34 16	3546	35 14 43	3582
	Jupiter	E.	45 59 33	3047	44 30 18	3047	43 1 3	3047	41 31 49	3047
	Aldebaran	E.	68 34 29	3080	67 5 55	3079	65 37 20	3079	64 8 45	3078
15	Venus	W.	92 19 41	3515	93 39 48	3513	94 59 58	3509	96 20 12	3504
	$\alpha$ Aquilæ	W.	75 59 54	3688	77 16 54	3677	78 34 5	3668	79 51 26	3659
	Fomalhaut	W.	41 10 36	3621	42 28 48	3587	43 47 36	3556	45 6 58	3526
	$\alpha$ Pegasi	W.	30 43 0	4957	31 40 29	4798	32 40 7	4657	33 41 43	4531
	Jupiter	E.	34 5 33	3045	32 36 16	3044	31 6 58	3043	29 37 39	3043
	Aldebaran	E.	56 45 17	3067	55 16 27	3064	53 47 33	3060	52 18 35	3056
	Pollux	E.	100 53 42	3104	99 25 37	3100	97 57 27	3096	96 29 12	3092
16	$\alpha$ Aquilæ	W.	86 20 33	3619	87 38 47	3612	88 57 8	3607	90 15 35	3601
	Fomalhaut	W.	51 51 12	3408	53 13 20	3389	54 35 49	3370	55 58 40	3351
	$\alpha$ Pegasi	W.	39 14 6	4071	40 24 36	4005	41 36 11	3943	42 48 47	3886
	Aldebaran	E.	44 52 29	3034	43 22 59	3029	41 53 22	3024	40 23 39	3018
	Pollux	E.	89 6 41	3069	87 37 53	3064	86 8 59	3058	84 39 58	3053
17	Fomalhaut	W.	62 57 47	3273	64 22 30	3259	65 47 29	3246	67 12 44	3232
	$\alpha$ Pegasi	W.	49 4 54	3662	50 22 22	3627	51 40 27	3594	52 59 8	3562
	Aldebaran	E.	32 53 18	2989	31 22 51	2982	29 52 16	2976	28 21 33	2970
	Pollux	E.	77 13 9	3023	75 43 25	3017	74 13 33	3010	72 43 33	3005
18	Fomalhaut	W.	74 22 43	3173	75 49 25	3162	77 16 20	3151	78 43 28	3140
	$\alpha$ Pegasi	W.	59 40 34	3431	61 2 16	3408	62 24 23	3387	63 46 54	3366
	Pollux	E.	65 11 35	2979	63 40 47	2965	62 9 51	2959	60 38 47	2954
	Regulus	E.	100 53 13	2929	99 21 31	2921	97 49 39	2913	96 17 37	2906
19	Fomalhaut	W.	86 2 9	3093	87 30 27	3084	88 58 56	3076	90 27 35	3069
	$\alpha$ Pegasi	W.	70 44 57	3280	72 9 32	3265	73 34 25	3250	74 59 35	3236
	$\alpha$ Arietis	W.	27 34 51	3635	28 52 47	3555	30 12 10	3484	31 32 52	3422
	Jupiter	W.	15 21 10	2932	16 52 48	2907	18 24 58	2885	19 57 36	2866
	Pollux	E.	53 1 31	2994	51 29 42	2917	49 57 45	2912	48 25 41	2903
	Regulus	E.	88 35 0	2866	87 1 58	2859	85 28 46	2850	83 55 23	2842
20	Fomalhaut	W.	97 53 10	3033	99 22 42	3026	100 52 23	3020	102 22 11	3015
	$\alpha$ Pegasi	W.	82 9 17	3176	83 35 55	3165	85 2 46	3155	86 29 49	3145
	$\alpha$ Arietis	W.	38 31 42	3196	39 57 56	3163	41 24 49	3132	42 52 20	3104
	Jupiter	W.	27 46 15	2793	29 20 52	2783	30 55 45	2770	32 30 52	2760

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## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
12	$\alpha$ Arietis E.	55° 50' 43"	3261	54° 26' 9"	3294	53° 1' 50"	3307	51° 37' 47"	3290
	Jupiter E.	63 53 44	3014	62 23 49	3020	60 54 1	3024	59 24 18	3028
	Aldebaran E.	86 19 29	3055	84 50 24	3059	83 21 24	3063	81 52 29	3066
13	Saturn W.	96 52 4	3121	98 19 48	3122	99 47 31	3123	101 15 13	3124
	Mars W.	93 43 7	3372	95 5 55	3373	96 28 42	3374	97 51 28	3374
	Venus W.	76 21 33	3534	77 41 20	3535	79 1 6	3535	80 20 52	3535
	$\alpha$ Aquilæ W.	60 54 13	3668	62 8 5	3647	63 22 19	3627	64 36 53	3611
	$\alpha$ Arietis E.	44 41 44	3401	43 19 29	3420	41 57 35	3441	40 36 5	3463
	Jupiter E.	51 56 46	3042	50 27 25	3043	48 58 6	3045	47 28 49	3046
	Aldebaran E.	74 28 49	3078	73 0 12	3079	71 31 37	3080	70 3 3	3080
14	Mars W.	104 45 21	3371	106 8 11	3369	107 31 3	3366	108 53 58	3364
	Venus W.	86 59 52	3528	88 19 45	3526	89 39 40	3524	90 59 38	3519
	$\alpha$ Aquilæ W.	70 53 55	3735	72 10 5	3722	73 26 29	3709	74 43 6	3699
	Fomalhaut W.	36 5 3	3792	37 20 13	3743	38 36 15	3698	39 53 4	3658
	$\alpha$ Arietis E.	33 55 49	3621	32 37 37	3664	31 20 12	3714	30 3 40	3771
	Jupiter E.	40 2 35	3047	38 33 20	3047	37 4 5	3046	35 34 49	3046
	Aldebaran E.	62 40 8	3076	61 11 29	3074	59 42 48	3072	58 14 4	3069
15	Venus W.	97 40 32	3499	99 0 57	3495	100 21 27	3489	101 42 3	3484
	$\alpha$ Aquilæ W.	81 8 57	3649	82 26 38	3641	83 44 28	3634	85 2 26	3625
	Fomalhaut W.	46 26 53	3499	47 47 18	3475	49 8 10	3452	50 29 28	3429
	$\alpha$ Pegasi W.	34 45 8	4418	35 50 13	4319	36 56 48	4228	38 4 48	4145
	Jupiter E.	28 8 20	3043	26 39 1	3043	25 9 42	3044	23 40 24	3046
	Aldebaran E.	50 49 32	3052	49 20 24	3048	47 51 11	3044	46 21 53	3039
	Pollux E.	95 0 53	3067	93 32 28	3063	92 3 58	3078	90 35 22	3074
16	$\alpha$ Aquilæ W.	91 34 8	3597	92 52 46	3591	94 11 30	3587	95 30 18	3585
	Fomalhaut W.	57 21 52	3335	58 45 23	3319	60 9 13	3303	61 33 21	3288
	$\alpha$ Pegasi W.	44 2 21	3834	45 16 48	3787	46 32 4	3742	47 48 7	3700
	Aldebaran E.	38 53 49	3013	37 23 52	3007	35 53 48	3001	34 23 37	2995
	Pollux E.	83 10 51	3047	81 41 37	3041	80 12 15	3035	78 42 46	3029
17	Fomalhaut W.	68 38 15	3220	70 4 1	3209	71 30 0	3196	72 56 14	3183
	$\alpha$ Pegasi W.	54 18 24	3533	55 38 12	3506	56 58 30	3479	58 19 18	3454
	Aldebaran E.	26 50 43	2964	25 19 45	2958	23 48 39	2951	22 17 25	2944
	Pollux E.	71 13 26	2998	69 43 11	2991	68 12 47	2985	66 42 15	2978
18	Fomalhaut W.	80 10 49	3130	81 38 22	3121	83 6 6	3111	84 34 2	3102
	$\alpha$ Pegasi W.	65 9 49	3347	66 33 6	3330	67 56 43	3313	69 20 40	3297
	Pollux E.	59 7 36	2947	57 36 17	2940	56 4 49	2934	54 33 13	2929
	Regulus E.	94 45 26	2998	93 13 5	2990	91 40 33	2982	90 7 51	2875
19	Fomalhaut W.	91 56 23	3060	93 25 21	3052	94 54 29	3045	96 23 46	3039
	$\alpha$ Pegasi W.	76 25 2	3223	77 50 44	3210	79 16 41	3198	80 42 52	3187
	$\alpha$ Arietis W.	32 54 44	3366	34 17 39	3318	35 41 30	3274	37 6 12	3233
	Jupiter W.	21 30 39	2848	23 4 4	2832	24 37 50	2818	26 11 54	2805
	Pollux E.	46 53 32	2903	45 21 17	2898	43 48 56	2894	42 16 30	2891
	Regulus E.	82 21 50	2834	80 48 6	2826	79 14 12	2818	77 40 7	2810
20	Fomalhaut W.	103 52 5	3010	105 22 5	3005	106 52 11	3001	108 22 22	2997
	$\alpha$ Pegasi W.	87 57 4	3137	89 24 29	3129	90 52 4	3121	92 19 48	3113
	$\alpha$ Arietis W.	44 20 25	3078	45 49 2	3052	47 18 10	3030	48 47 46	3009
	Jupiter W.	34 6 13	2749	35 41 48	2739	37 17 36	2729	38 53 37	2719

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LUNAR DISTANCES.										
Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
20	Pollux	E.	40° 44' 0"	2888	39° 11' 26"	2887	37° 38' 50"	2886	36° 6' 13"	2885
	Regulus	E.	76 5 52	2801	74 31 26	2793	72 56 49	2785	71 22 1	2777
21	α Pegasi	W.	93 47 42	3106	95 15 44	3100	96 43 54	3094	98 12 11	3089
	α Arietis	W.	50 17 48	2988	51 48 16	2989	53 19 8	2950	54 50 23	2933
	Jupiter	W.	40 29 51	2710	42 6 18	2701	43 42 57	2691	45 19 49	2683
	Aldebaran	W.	16 49 53	2747	18 25 30	2738	20 1 20	2728	21 37 23	2718
	Regulus	E.	63 25 22	2736	61 49 30	2728	60 13 27	2719	58 37 13	2711
22	α Arietis	W.	62 31 50	2856	64 5 5	2843	65 38 37	2830	67 12 26	2818
	Jupiter	W.	53 27 7	2638	55 5 11	2629	56 43 27	2620	58 21 55	2611
	Aldebaran	W.	29 40 50	2671	31 18 9	2663	32 55 39	2654	34 33 21	2644
	Regulus	E.	50 33 19	2670	48 55 59	2662	47 18 28	2654	45 40 46	2645
	Spica	E.	104 24 59	2701	102 48 21	2692	101 11 30	2683	99 34 27	2675
23	α Arietis	W.	75 5 31	2758	76 40 54	2747	78 16 31	2737	79 52 22	2726
	Jupiter	W.	66 37 15	2567	68 16 55	2559	69 56 47	2550	71 36 51	2540
	Aldebaran	W.	42 44 54	2600	44 23 49	2591	46 2 56	2583	47 42 15	2574
	Regulus	E.	37 29 26	2604	35 50 37	2596	34 11 36	2588	32 32 24	2580
	Spica	E.	91 26 18	2631	89 48 5	2622	88 9 40	2613	86 31 3	2604
24	α Arietis	W.	87 54 59	2678	89 32 9	2668	91 9 32	2659	92 47 7	2651
	Jupiter	W.	80 0 19	2496	81 41 38	2487	83 23 10	2477	85 4 55	2469
	Aldebaran	W.	56 1 57	2527	57 42 32	2519	59 23 19	2510	61 4 19	2500
	Spica	E.	78 14 59	2561	76 35 11	2552	74 55 10	2544	73 14 58	2535
	Sun	E.	118 30 23	2883	116 57 43	2873	115 24 50	2862	113 51 43	2852
25	Jupiter	W.	93 36 52	2423	95 19 54	2413	97 3 10	2404	98 46 39	2395
	Aldebaran	W.	69 32 36	2453	71 14 55	2443	72 57 28	2434	74 40 14	2424
	Pollux	W.	26 16 11	2639	27 54 22	2604	29 33 11	2590	31 12 34	2576
	Spica	E.	64 50 59	2493	63 9 36	2485	61 28 2	2477	59 46 16	2469
	Sun	E.	106 2 48	2800	104 28 20	2790	102 53 39	2779	101 18 44	2769
26	Aldebaran	W.	83 17 30	2377	85 1 38	2367	86 46 0	2357	88 30 36	2348
	Pollux	W.	39 36 49	2462	41 18 55	2448	43 1 22	2433	44 44 10	2419
	Spica	E.	51 14 43	2431	49 31 53	2426	47 48 55	2419	46 5 48	2414
	Sun	E.	93 20 41	2716	91 44 23	2706	90 7 51	2695	88 31 5	2686
27	Aldebaran	W.	97 17 1	2302	99 2 58	2292	100 49 9	2283	102 35 33	2275
	Pollux	W.	53 22 57	2355	55 7 36	2344	56 52 31	2333	58 37 42	2322
	Regulus	W.	17 12 56	2396	18 58 18	2313	20 43 59	2301	22 29 57	2289
	Spica	E.	37 28 28	2396	35 44 47	2386	34 1 5	2366	32 17 25	2400
	Sun	E.	80 23 52	2635	78 45 45	2625	77 7 24	2616	75 28 51	2607
28	Pollux	W.	67 27 22	2274	69 14 0	2266	71 0 50	2258	72 47 52	2249
	Regulus	W.	31 23 44	2241	33 11 11	2232	34 58 51	2224	36 46 43	2216
	Sun	E.	67 12 59	2563	65 33 13	2555	63 53 16	2547	62 13 8	2540
29	Pollux	W.	81 45 53	2214	83 33 59	2209	85 22 13	2204	87 10 35	2200
	Regulus	W.	45 48 46	2182	47 37 40	2177	49 26 42	2173	51 15 52	2167
	Sun	E.	53 50 7	2508	52 9 5	2503	50 27 56	2499	48 46 41	2495
30	Pollux	W.	96 13 54	2183	98 2 47	2182	99 51 42	2180	101 40 39	2180
	Regulus	W.	60 23 18	2149	62 13 2	2148	64 2 48	2146	65 52 37	2145
	Sun	E.	40 19 19	2483	38 37 42	2482	36 56 4	2482	35 14 26	2485



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXh.	P. L. of Diff.
20	Pollux	E.	34° 33' 35"	2887	33° 0' 59"	2889	31° 28' 26"	2893	29° 55' 58"	2899
	Regulus	E.	69 47 3	2769	68 11 54	2760	66 36 34	2752	65 1 3	2744
21	α Pegasi	W.	99 40 34	3064	101 9 3	3081	102 37 36	3078	104 6 13	3074
	α Arietis	W.	56 22 0	2916	57 53 58	2901	59 26 16	2896	60 58 53	2870
	Jupiter	W.	46 56 52	2874	48 34 7	2864	50 11 35	2855	51 49 15	2846
	Aldebaran	W.	23 13 39	2708	24 50 8	2699	26 26 49	2689	28 3 43	2680
	Regulus	E.	57 0 48	2703	55 24 12	2685	53 47 26	2687	52 10 28	2678
22	α Arietis	W.	68 46 31	2805	70 20 52	2792	71 55 30	2781	73 30 23	2769
	Jupiter	W.	60 0 35	2802	61 39 27	2593	63 18 31	2585	64 57 47	2576
	Aldebaran	W.	36 11 16	2635	37 49 23	2627	39 27 41	2618	41 6 11	2609
	Regulus	E.	44 2 52	2637	42 24 47	2629	40 46 31	2621	39 8 4	2612
	Spica	E.	97 57 13	2666	96 19 47	2657	94 42 9	2648	93 4 19	2640
23	α Arietis	W.	81 28 27	2716	83 4 45	2706	84 41 17	2696	86 18 2	2687
	Jupiter	W.	73 17 8	2532	74 57 37	2522	76 38 19	2514	78 19 13	2505
	Aldebaran	W.	49 21 46	2564	51 1 30	2556	52 41 26	2546	54 21 35	2537
	Regulus	E.	30 53 2	2572	29 13 29	2564	27 33 45	2556	25 53 50	2548
	Spica	E.	84 52 14	2596	83 13 13	2587	81 34 0	2578	79 54 35	2570
24	α Arietis	W.	94 24 53	2642	96 2 51	2634	97 41 0	2626	99 19 20	2617
	Jupiter	W.	86 46 52	2460	88 29 2	2450	90 11 26	2441	91 54 3	2432
	Aldebaran	W.	62 45 32	2480	64 26 59	2462	66 8 38	2472	67 50 30	2462
	Spica	E.	71 34 34	2727	69 53 58	2618	68 13 10	2610	66 32 10	2602
	SUN	E.	112 18 23	2842	110 44 50	2831	109 11 3	2821	107 37 2	2811
25	Jupiter	W.	100 30 21	2386	102 14 16	2376	103 58 25	2366	105 42 48	2357
	Aldebaran	W.	76 23 14	2415	78 6 28	2405	79 49 55	2396	81 33 36	2387
	Pollux	W.	32 52 29	2535	34 32 54	2515	36 13 47	2496	37 55 6	2479
	Spica	E.	58 4 19	2461	56 22 11	2453	54 39 52	2446	52 57 23	2438
	SUN	E.	99 43 35	2759	98 8 13	2747	96 32 36	2737	94 56 45	2727
26	Aldebaran	W.	90 15 26	2336	92 0 30	2329	93 45 47	2320	95 31 17	2311
	Pollux	W.	46 27 18	2405	48 10 45	2392	49 54 31	2380	51 38 35	2367
	Spica	E.	44 22 33	2409	42 39 11	2404	40 55 42	2400	39 12 7	2397
	SUN	E.	86 54 6	2675	85 16 53	2665	83 39 26	2655	82 1 46	2645
27	Aldebaran	W.	104 22 9	2266	106 8 58	2258	107 56 0	2249	109 43 14	2241
	Pollux	W.	60 23 9	2312	62 8 51	2302	63 54 47	2292	65 40 58	2283
	Regulus	W.	24 16 12	2279	26 2 43	2268	27 49 29	2258	29 36 30	2249
	Spica	E.	30 33 50	2405	28 50 23	2413	27 7 7	2424	25 24 7	2441
	SUN	E.	73 50 5	2598	72 11 7	2588	70 31 56	2580	68 52 33	2572
28	Pollux	W.	74 35 7	2241	76 22 33	2234	78 10 10	2227	79 57 57	2221
	Regulus	W.	38 34 46	2208	40 23 1	2202	42 11 26	2195	44 0 1	2188
	SUN	E.	60 32 51	2533	58 52 24	2526	57 11 47	2520	55 31 1	2514
29	Pollux	W.	88 59 3	2195	90 47 38	2191	92 36 19	2188	94 25 5	2186
	Regulus	W.	53 5 9	2163	54 54 33	2159	56 44 3	2155	58 33 38	2152
	SUN	E.	47 5 21	2492	45 23 56	2489	43 42 27	2486	42 0 54	2485
30	Pollux	W.	103 29 36	2180	105 18 33	2180	107 7 30	2182	108 56 25	2184
	Regulus	W.	67 42 27	2145	69 32 18	2145	71 22 9	2145	73 12 0	2146
	SUN	E.	33 32 51	2487	31 51 19	2490	30 9 52	2495	28 28 32	2502

## AT GREENWICH APPARENT NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Sidereal Time of the Semi-diameter passing the Meridian.	Equation of Time, to be subtracted from		Diff. for 1 hour.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	Semi-diameter.	added to Apparent Time.				
Wed.	1	<sup>h</sup> 16 <sup>m</sup> 30 <sup>s</sup> 48.01	10.811	S.21° 52' 17.7"	22.99	16' 16.03"	70.33	<sup>m</sup> 10 <sup>s</sup> 41.34	0.955		
Thur.	2	16 35 7.86	10.837	22 1 17.0	21.93	16 16.17	70.41	10 18.12	0.981		
Frid.	3	16 39 28.32	10.862	22 9 50.9	20.86	16 16.31	70.49	9 54.28	1.006		
Sat.	4	16 43 49.37	10.886	22 17 59.1	19.78	16 16.45	70.57	9 29.86	1.030		
Sun.	5	16 48 10.97	10.909	22 25 41.2	18.69	16 16.58	70.65	9 4.88	1.053		
Mon.	6	16 52 33.12	10.930	22 32 57.1	17.59	16 16.71	70.72	8 39.35	1.074		
Tues.	7	16 56 55.79	10.950	22 39 46.5	16.49	16 16.84	70.79	8 13.31	1.094		
Wed.	8	17 1 18.93	10.969	22 46 9.2	15.37	16 16.96	70.85	7 46.81	1.113		
Thur.	9	17 5 42.50	10.987	22 52 4.7	14.24	16 17.08	70.91	7 19.87	1.131		
Frid.	10	17 10 6.47	11.003	22 57 33.1	13.11	16 17.20	70.97	6 52.52	1.147		
Sat.	11	17 14 30.82	11.018	23 2 34.4	11.97	16 17.31	71.02	6 24.80	1.162		
Sun.	12	17 18 55.54	11.032	23 7 8.3	10.82	16 17.41	71.07	5 56.71	1.176		
Mon.	13	17 23 20.59	11.045	23 11 14.5	9.67	16 17.51	71.11	5 28.30	1.189		
Tues.	14	17 27 45.91	11.057	23 14 52.9	8.51	16 17.61	71.15	4 59.62	1.201		
Wed.	15	17 32 11.48	11.067	23 18 3.3	7.35	16 17.70	71.19	4 30.69	1.211		
Thur.	16	17 36 37.29	11.076	23 20 45.8	6.18	16 17.79	71.22	4 1.52	1.220		
Frid.	17	17 41 3.29	11.084	23 23 0.3	5.01	16 17.87	71.25	3 32.16	1.228		
Sat.	18	17 45 29.47	11.090	23 24 46.6	3.84	16 17.94	71.27	3 2.61	1.234		
Sun.	19	17 49 55.80	11.095	23 26 4.7	2.66	16 18.00	71.29	2 32.92	1.239		
Mon.	20	17 54 22.22	11.099	23 26 54.4	1.48	16 18.06	71.30	2 3.14	1.243		
Tues.	21	17 58 48.71	11.102	23 27 16.0	0.30	16 18.11	71.31	1 33.29	1.246		
Wed.	22	18 3 15.26	11.103	23 27 9.3	0.87	16 18.16	71.31	1 3.36	1.247		
Thur.	23	18 7 41.84	11.103	23 26 34.3	2.05	16 18.20	71.31	0 33.43	1.247		
Frid.	24	18 12 8.41	11.102	23 25 31.0	3.22	16 18.24	71.30	0 3.51	1.246		
Sat.	25	18 16 34.92	11.100	23 23 59.5	4.40	16 18.27	71.29	0 26.37	1.244		
Sun.	26	18 21 1.37	11.096	23 21 59.7	5.57	16 18.30	71.27	0 56.18	1.240		
Mon.	27	18 25 27.70	11.091	23 19 31.8	6.75	16 18.32	71.25	1 25.87	1.235		
Tues.	28	18 29 53.88	11.084	23 16 35.8	7.92	16 18.33	71.22	1 55.40	1.228		
Wed.	29	18 34 19.87	11.076	23 13 11.7	9.08	16 18.34	71.19	2 24.75	1.220		
Thur.	30	18 38 45.65	11.066	23 9 19.6	10.24	16 18.35	71.16	2 53.90	1.210		
Frid.	31	18 43 11.17	11.054	23 4 59.8	11.39	16 18.35	71.12	3 22.79	1.198		
Sat.	32	18 47 36.39	11.041	S.23 0 12.5	12.54	16 18.35	71.07	3 51.28	1.185		

NOTE.—Mean Time of the Semidiameter passing may be found by subtracting 0s.19 from the Sidereal Time.

## AT GREENWICH MEAN NOON.

Day of the Week.	Day of the Month.	THE SUN'S						Equation of Time to be added to	Diff. for 1 hour.	Sidereal Time or Right Ascension of Mean Sun.
		Apparent Right Ascension.	Diff. for 1 hour.	Apparent Declination.	Diff. for 1 hour.	subtracted from Mean Time.				
Wed.	1	<sup>h</sup> 16 <sup>m</sup> 30 <sup>s</sup> 49.94	10.811	S.21° 52' 21".7	22.99	<sup>m</sup> 10 <sup>s</sup> 41.17	0.955	<sup>h</sup> 16 <sup>m</sup> 41 <sup>s</sup> 31.11		
Thur.	2	16 35 9.72	10.837	22 1 20.8	21.93	10 17.95	0.981	16 45 27.67		
Frid.	3	16 39 30.11	10.862	22 9 54.4	20.86	9 54.11	1.006	16 49 24.22		
Sat.	4	16 43 51.09	10.886	22 18 2.2	19.78	9 29.69	1.030	16 53 20.78		
Sun.	5	16 48 12.62	10.909	22 25 44.0	18.69	9 4.72	1.053	16 57 17.34		
Mon.	6	16 52 34.70	10.930	22 32 59.6	17.59	8 39.19	1.074	17 1 13.89		
Tues.	7	16 56 57.29	10.950	22 39 48.8	16.49	8 13.16	1.094	17 5 10.45		
Wed.	8	17 1 20.35	10.969	22 46 11.2	15.37	7 46.66	1.113	17 9 7.01		
Thur.	9	17 5 43.84	10.987	22 52 6.5	14.24	7 19.73	1.131	17 13 3.57		
Frid.	10	17 10 7.73	11.003	22 57 34.7	13.11	6 52.39	1.147	17 17 0.12		
Sat.	11	17 14 32.00	11.018	23 2 35.8	11.97	6 24.68	1.162	17 20 56.68		
Sun.	12	17 18 56.64	11.032	23 7 9.4	10.82	5 56.60	1.176	17 24 53.24		
Mon.	13	17 23 21.60	11.045	23 11 15.4	9.67	5 28.20	1.189	17 28 49.80		
Tues.	14	17 27 46.83	11.057	23 14 53.6	8.51	4 59.52	1.201	17 32 46.35		
Wed.	15	17 32 12.31	11.067	23 18 3.9	7.35	4 30.60	1.211	17 36 42.91		
Thur.	16	17 36 38.03	11.076	23 20 46.3	6.18	4 1.44	1.220	17 40 39.47		
Frid.	17	17 41 3.94	11.084	23 23 0.6	5.01	3 32.09	1.228	17 44 36.03		
Sat.	18	17 45 30.03	11.090	23 24 46.8	3.84	3 2.55	1.234	17 48 32.58		
Sun.	19	17 49 56.27	11.095	23 26 4.8	2.66	2 32.87	1.239	17 52 29.14		
Mon.	20	17 54 22.60	11.099	23 26 54.5	1.48	2 3.10	1.243	17 56 25.70		
Tues.	21	17 58 49.00	11.102	23 27 16.0	0.30	1 33.26	1.246	18 0 22.26		
Wed.	22	18 3 15.47	11.103	23 27 9.3	0.87	1 3.34	1.247	18 4 18.81		
Thur.	23	18 7 41.95	11.103	23 26 34.3	2.05	0 33.42	1.247	18 8 15.37		
Frid.	24	18 12 8.42	11.102	23 25 31.0	3.22	0 3.51	1.246	18 12 11.93		
Sat.	25	18 16 34.84	11.100	23 23 59.5	4.40	0 26.35	1.244	18 16 8.49		
Sun.	26	18 21 1.20	11.096	23 21 59.8	5.57	0 56.18	1.240	18 20 5.04		
Mon.	27	18 25 27.44	11.091	23 19 32.1	6.75	1 25.84	1.235	18 24 1.60		
Tues.	28	18 29 53.52	11.084	23 16 36.1	7.92	1 55.36	1.228	18 27 58.16		
Wed.	29	18 34 19.42	11.076	23 13 12.0	9.08	2 24.70	1.220	18 31 54.72		
Thur.	30	18 38 45.11	11.066	23 9 20.1	10.24	2 53.84	1.210	18 35 51.27		
Frid.	31	18 43 10.55	11.054	23 5 0.5	11.39	3 22.72	1.198	18 39 47.83		
Sat.	32	18 47 35.69	11.041	S.23° 0' 13.3	12.54	3 51.30	1.185	18 43 44.39		

NOTE.—The Semidiameter for Mean Noon may be assumed the same as that for Apparent Noon.

Diff. for 1 hour  
+ 9".8565

AT GREENWICH MEAN NOON.									
Day of the Month.	Day of the Year.	THE SUN'S					Logarithm of the Radius Vector of the Earth.	Diff. for 1 hour.	Mean Time of Sidereal Oh.
		True LONGITUDE.		Diff. for 1 hour.	LATITUDE.				
		$\lambda$	$\lambda'$						
1	335	249° 23' 41.5	23' 11.4	152.23	+0.41	9.9937120	26.9	<sup>h</sup> 7 <sup>m</sup> 17 17.05	
2	336	250 24 35.7	24 5.4	152.28	0.37	.9936483	26.3	7 13 21.15	
3	337	251 25 31.0	25 0.6	152.33	0.30	.9935860	25.7	7 9 25.24	
4	338	252 26 27.4	25 56.8	152.37	0.21	.9935251	25.1	7 5 29.33	
5	339	253 27 24.7	26 53.9	152.41	+0.10	.9934655	24.5	7 1 33.42	
6	340	254 28 22.9	27 51.9	152.44	−0.03	.9934072	23.9	6 57 37.50	
7	341	255 29 21.9	28 50.8	152.47	0.17	.9933505	23.3	6 53 41.59	
8	342	256 30 21.6	29 50.4	152.50	0.30	.9932954	22.6	6 49 45.67	
9	343	257 31 22.0	30 50.6	152.53	0.43	.9932420	21.8	6 45 49.76	
10	344	258 32 22.9	31 51.3	152.55	0.54	.9931904	21.0	6 41 53.85	
11	345	259 33 24.3	32 52.5	152.57	0.63	.9931409	20.1	6 37 57.94	
12	346	260 34 26.1	33 54.2	152.58	0.69	.9930935	19.2	6 34 2.03	
13	347	261 35 28.4	34 56.3	152.60	0.73	.9930484	18.3	6 30 6.12	
14	348	262 36 31.2	35 58.9	152.62	0.74	.9930056	17.3	6 26 10.21	
15	349	263 37 34.4	37 1.9	152.64	0.71	.9929653	16.3	6 22 14.30	
16	350	264 38 38.1	38 5.4	152.66	0.66	.9929277	15.2	6 18 18.39	
17	351	265 39 42.2	39 9.4	152.68	0.58	.9928929	14.0	6 14 22.48	
18	352	266 40 46.8	40 13.9	152.70	0.48	.9928609	12.8	6 10 26.56	
19	353	267 41 51.9	41 18.8	152.72	0.35	.9928316	11.6	6 6 30.65	
20	354	268 42 57.5	42 24.2	152.74	0.22	.9928052	10.4	6 2 34.74	
21	355	269 44 3.7	43 30.2	152.76	−0.08	.9927815	9.3	5 58 38.82	
22	356	270 45 10.5	44 36.8	152.78	+0.05	.9927605	8.2	5 54 42.91	
23	357	271 46 17.8	45 44.0	152.81	0.16	.9927422	7.1	5 50 47.00	
24	358	272 47 25.7	46 51.7	152.84	0.26	.9927265	6.0	5 46 51.09	
25	359	273 48 34.1	47 59.9	152.87	0.35	.9927132	5.0	5 42 55.18	
26	360	274 49 43.1	49 8.7	152.89	0.40	.9927022	4.1	5 38 59.27	
27	361	275 50 52.6	50 18.1	152.91	0.42	.9926934	3.2	5 35 3.35	
28	362	276 52 2.6	51 27.9	152.92	0.41	.9926867	2.3	5 31 7.44	
29	363	277 53 13.0	52 38.1	152.93	0.37	.9926819	1.6	5 27 11.53	
30	364	278 54 23.8	53 48.7	152.95	0.31	.9926790	0.9	5 23 15.62	
31	365	279 55 34.9	54 59.6	152.96	0.22	.9926779	0.2	5 19 19.71	
32	366	280 56 46.0	56 10.6	152.97	+0.12	9.9926785	0.6	5 15 23.80	
NOTE: $\lambda$ corresponds to the true equinox of the date, $\lambda'$ to the mean equinox of January 0d.									Diff. for 1 hour −9 <sup>s</sup> .830

## GREENWICH MEAN TIME.

## THE MOON'S

Day of the Month.

	SEMI- DIAMETER.		HORIZONTAL PARALLAX.				MERIDIAN PASSAGE.		AGE.
	Noon.	Midnight.	Noon.	Diff. for 1 hour.	Midnight.	Diff. for 1 hour.		Diff. for 1 hour.	
							<sup>h</sup> <sup>m</sup>	<sup>m</sup> <sup>d</sup>	
1	16' 24.5	16' 23.0	60' 6.7	-0.33	60' 1.0	-0.61	22 58.1	2.34	27.5
2	16 20.5	16 17.2	59 52.0	0.89	59 39.7	1.15	23 55.1	2.39	28.5
3	16 13.0	16 8.1	59 24.3	1.40	59 6.2	1.61	♄		0.1
4	16 2.5	15 56.4	58 45.8	1.79	58 23.6	1.92	0 53.0	2.40	1.1
5	15 50.0	15 43.3	57 59.9	2.01	57 35.5	2.06	1 50.3	2.35	2.1
6	15 36.6	15 29.9	57 10.7	2.06	56 46.2	2.02	2 45.8	2.25	3.1
7	15 23.4	15 17.3	56 22.4	1.94	55 59.8	1.83	3 38.5	2.12	4.1
8	15 11.5	15 6.3	55 38.7	1.69	55 19.4	1.52	4 27.8	1.99	5.1
9	15 1.6	14 57.6	55 2.2	1.34	54 47.3	1.14	5 14.1	1.88	6.1
10	14 54.2	14 51.5	54 34.9	0.93	54 25.1	0.71	5 58.0	1.79	7.1
11	14 49.5	14 48.3	54 17.9	0.49	54 13.3	-0.27	6 40.1	1.74	8.1
12	14 47.7	14 47.9	54 11.3	-0.06	54 11.9	+0.15	7 21.5	1.73	9.1
13	14 48.7	14 50.2	54 15.0	+0.35	54 20.4	0.54	8 2.9	1.75	10.1
14	14 52.3	14 54.9	54 27.9	0.72	54 37.5	0.88	8 45.3	1.80	11.1
15	14 58.0	15 1.5	54 48.9	1.02	55 1.8	1.14	9 29.5	1.89	12.1
16	15 5.4	15 9.5	55 16.0	1.23	55 31.3	1.31	10 16.1	2.00	13.1
17	15 13.9	15 18.4	55 47.3	1.36	56 3.8	1.39	11 5.5	2.12	14.1
18	15 22.9	15 27.4	56 20.6	1.39	56 37.2	1.38	11 57.7	2.22	15.1
19	15 31.9	15 36.3	56 53.6	1.35	57 9.5	1.30	12 52.1	2.29	16.1
20	15 40.4	15 44.4	57 24.8	1.24	57 39.2	1.17	13 47.7	2.31	17.1
21	15 48.1	15 51.5	57 52.8	1.09	58 5.4	1.01	14 43.2	2.29	18.1
22	15 54.6	15 57.5	58 16.9	0.92	58 27.5	0.84	15 37.6	2.24	19.1
23	16 0.1	16 2.4	58 37.1	0.76	58 45.6	0.67	16 30.5	2.18	20.1
24	16 4.5	16 6.3	58 53.2	0.59	58 59.9	0.52	17 22.1	2.13	21.1
25	16 7.9	16 9.2	59 5.6	0.44	59 10.4	0.35	18 12.7	2.11	22.1
26	16 10.2	16 10.9	59 14.1	0.27	59 16.7	+0.17	19 3.2	2.12	23.1
27	16 11.3	16 11.3	59 18.1	+0.06	59 18.2	-0.05	19 54.5	2.17	24.1
28	16 10.9	16 10.1	59 16.8	-0.18	59 13.8	-0.32	20 47.3	2.24	25.1
29	16 8.8	16 7.0	59 9.1	0.47	59 2.5	0.63	21 41.9	2.31	26.1
30	16 4.7	16 1.9	58 54.0	0.79	58 43.6	0.95	22 38.2	2.36	27.1
31	15 58.5	15 54.7	58 31.3	1.10	58 17.2	1.25	23 35.1	2.36	28.1
32	15 50.4	15 45.7	58 1.4	-1.38	57 44.3	-1.48	♄		29.1

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 1.					FRIDAY 3.				
0	14 48 25.34	2.3600	S. 11° 1' 7.7	11.573	0	16 44 42.54	2.4734	S. 18° 31' 51.6	6.753
1	14 50 47.02	2.3628	11 12 40.0	11.503	1	16 47 10.99	2.4747	18 38 33.0	6.627
2	14 53 8.87	2.3656	11 24 8.0	11.431	2	16 49 39.51	2.4759	18 45 6.8	6.500
3	14 55 30.89	2.3683	11 35 31.7	11.358	3	16 52 8.10	2.4771	18 51 33.0	6.373
4	14 57 53.07	2.3711	11 46 51.0	11.284	4	16 54 36.76	2.4782	18 57 51.5	6.245
5	15 0 15.42	2.3739	11 58 5.8	11.208	5	16 57 5.48	2.4792	19 4 2.3	6.116
6	15 2 37.94	2.3767	12 9 15.9	11.131	6	16 59 34.26	2.4800	19 10 5.4	5.987
7	15 5 0.63	2.3796	12 20 21.4	11.052	7	17 2 3.09	2.4808	19 16 0.7	5.857
8	15 7 23.49	2.3824	12 31 22.1	10.971	8	17 4 31.96	2.4815	19 21 48.2	5.726
9	15 9 46.52	2.3852	12 42 17.9	10.889	9	17 7 0.87	2.4822	19 27 27.8	5.595
10	15 12 9.71	2.3880	12 53 8.8	10.806	10	17 9 29.83	2.4828	19 32 59.6	5.464
11	15 14 33.07	2.3908	13 3 54.6	10.722	11	17 11 58.82	2.4833	19 38 23.5	5.332
12	15 16 56.61	2.3936	13 14 35.4	10.636	12	17 14 27.83	2.4837	19 43 39.4	5.199
13	15 19 20.31	2.3963	13 25 11.0	10.549	13	17 16 56.87	2.4841	19 48 47.3	5.066
14	15 21 44.17	2.3991	13 35 41.3	10.461	14	17 19 25.92	2.4843	19 53 47.3	4.932
15	15 24 8.20	2.4018	13 46 6.3	10.371	15	17 21 54.99	2.4845	19 58 39.2	4.798
16	15 26 32.39	2.4045	13 56 25.8	10.280	16	17 24 24.06	2.4846	20 3 23.1	4.664
17	15 28 56.74	2.4072	14 6 39.8	10.187	17	17 26 53.14	2.4847	20 7 58.9	4.530
18	15 31 21.26	2.4099	14 16 48.2	10.093	18	17 29 22.22	2.4846	20 12 26.7	4.395
19	15 33 45.94	2.4126	14 26 51.0	9.998	19	17 31 51.29	2.4843	20 16 46.4	4.260
20	15 36 10.77	2.4152	14 36 48.0	9.902	20	17 34 20.34	2.4840	20 20 57.9	4.125
21	15 38 35.76	2.4178	14 46 39.2	9.805	21	17 36 49.37	2.4837	20 25 1.3	3.989
22	15 41 0.91	2.4205	14 56 24.6	9.706	22	17 39 18.39	2.4833	20 28 56.6	3.853
23	15 43 26.22	2.4231	S. 15° 6' 4.0	9.606	23	17 41 47.38	2.4828	S. 20° 32' 43.7	3.717
THURSDAY 2.					SATURDAY 4.				
0	15 45 51.68	2.4256	S. 15° 15' 37.3	9.505	0	17 44 16.33	2.4822	S. 20° 36' 22.6	3.581
1	15 48 17.29	2.4281	15 25 4.5	9.402	1	17 46 45.24	2.4815	20 39 53.4	3.445
2	15 50 43.05	2.4306	15 34 25.5	9.298	2	17 49 14.11	2.4807	20 43 16.0	3.309
3	15 53 8.96	2.4331	15 43 40.3	9.194	3	17 51 42.93	2.4798	20 46 30.4	3.172
4	15 55 35.02	2.4355	15 52 48.8	9.088	4	17 54 11.69	2.4788	20 49 36.6	3.035
5	15 58 1.22	2.4379	16 1 50.9	8.981	5	17 56 40.39	2.4778	20 52 34.6	2.898
6	16 0 27.56	2.4402	16 10 46.5	8.872	6	17 59 9.03	2.4766	20 55 24.4	2.762
7	16 2 54.04	2.4424	16 19 35.6	8.763	7	18 1 37.59	2.4753	20 58 6.0	2.626
8	16 5 20.65	2.4446	16 28 18.1	8.653	8	18 4 6.07	2.4740	21 0 39.5	2.489
9	16 7 47.39	2.4468	16 36 54.0	8.542	9	18 6 34.47	2.4726	21 3 4.8	2.353
10	16 10 14.27	2.4490	16 45 23.1	8.429	10	18 9 2.78	2.4711	21 5 21.8	2.216
11	16 12 41.28	2.4512	16 53 45.4	8.315	11	18 11 30.99	2.4694	21 7 30.7	2.080
12	16 15 8.41	2.4533	17 2 0.9	8.200	12	18 13 59.11	2.4676	21 9 31.4	1.944
13	16 17 35.66	2.4553	17 10 9.4	8.084	13	18 16 27.12	2.4658	21 11 23.9	1.808
14	16 20 3.04	2.4572	17 18 11.0	7.968	14	18 18 55.01	2.4639	21 13 8.3	1.672
15	16 22 30.53	2.4591	17 26 5.6	7.851	15	18 21 22.78	2.4619	21 14 44.6	1.537
16	16 24 58.13	2.4609	17 33 53.1	7.732	16	18 23 50.44	2.4598	21 16 12.7	1.401
17	16 27 25.84	2.4627	17 41 33.4	7.613	17	18 26 17.97	2.4577	21 17 32.7	1.266
18	16 29 53.65	2.4644	17 49 6.6	7.493	18	18 28 45.37	2.4555	21 18 44.6	1.131
19	16 32 21.57	2.4661	17 56 32.5	7.371	19	18 31 12.63	2.4532	21 19 48.4	0.997
20	16 34 49.58	2.4677	18 3 51.1	7.249	20	18 33 39.75	2.4508	21 20 44.2	0.863
21	16 37 17.69	2.4692	18 11 2.3	7.126	21	18 36 6.72	2.4482	21 21 32.0	0.729
22	16 39 45.89	2.4707	18 18 6.2	7.002	22	18 38 33.53	2.4456	21 22 11.7	0.596
23	16 42 14.17	2.4721	18 25 2.7	6.878	23	18 41 0.18	2.4429	21 22 43.4	0.463
24	16 44 42.54	2.4734	S. 18° 31' 51.6	6.753	24	18 43 26.68	2.4402	S. 21° 23' 7.2	0.330

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SUNDAY 5.					TUESDAY 7.				
0	18 <sup>h</sup> 43 <sup>m</sup> 26.68 <sup>s</sup>	2.4402	S. 21° 23' 7.2"	0.330	0	20 <sup>h</sup> 36 <sup>m</sup> 7.33 <sup>s</sup>	2.2357	S. 19° 18' 7.2"	5.236
1	18 45 53.01	2.4374	21 23 23.0	0.198	1	20 38 21.32	2.2306	19 12 50.2	5.330
2	18 48 19.17	2.4344	21 23 30.9	0.065	2	20 40 35.00	2.2255	19 7 27.6	5.424
3	18 50 45.15	2.4313	21 23 30.9	0.065	3	20 42 48.37	2.2203	19 1 59.4	5.517
4	18 53 10.95	2.4283	21 23 23.1	0.198	4	20 45 1.43	2.2152	18 56 25.5	5.610
5	18 55 36.56	2.4252	21 23 7.4	0.327	5	20 47 14.18	2.2100	18 50 46.1	5.701
6	18 58 1.98	2.4220	21 22 43.9	0.456	6	20 49 26.63	2.2049	18 45 1.4	5.791
7	19 0 27.20	2.4188	21 22 12.7	0.585	7	20 51 38.77	2.1997	18 39 11.3	5.880
8	19 2 52.23	2.4154	21 21 33.7	0.714	8	20 53 50.59	2.1945	18 33 15.8	5.968
9	19 5 17.05	2.4119	21 20 47.0	0.842	9	20 56 2.10	2.1893	18 27 15.0	6.056
10	19 7 41.66	2.4084	21 19 52.7	0.969	10	20 58 13.30	2.1841	18 21 9.1	6.142
11	19 10 6.05	2.4048	21 18 50.8	1.096	11	21 0 24.19	2.1789	18 14 58.1	6.227
12	19 12 30.23	2.4011	21 17 41.2	1.222	12	21 2 34.77	2.1738	18 8 41.9	6.311
13	19 14 54.19	2.3974	21 16 24.1	1.348	13	21 4 45.04	2.1687	18 2 20.7	6.395
14	19 17 17.92	2.3936	21 14 59.5	1.473	14	21 6 55.01	2.1635	17 55 54.5	6.478
15	19 19 41.42	2.3897	21 13 27.4	1.597	15	21 9 4.67	2.1584	17 49 23.4	6.560
16	19 22 4.68	2.3858	21 11 47.9	1.720	16	21 11 14.02	2.1533	17 42 47.3	6.641
17	19 24 27.70	2.3818	21 10 1.0	1.843	17	21 13 23.06	2.1482	17 36 6.4	6.720
18	19 26 50.49	2.3777	21 8 6.8	1.965	18	21 15 31.80	2.1431	17 29 20.9	6.799
19	19 29 13.03	2.3736	21 6 5.3	2.086	19	21 17 40.23	2.1380	17 22 30.6	6.877
20	19 31 35.32	2.3694	21 3 56.5	2.207	20	21 19 48.36	2.1329	17 15 35.7	6.953
21	19 33 57.36	2.3652	21 1 40.5	2.327	21	21 21 56.19	2.1279	17 8 36.2	7.029
22	19 36 19.15	2.3609	20 59 17.3	2.446	22	21 24 3.71	2.1228	17 1 32.2	7.104
23	19 38 40.68	2.3566	S. 20 56 47.0	2.563	23	21 26 10.93	2.1178	S. 16 54 23.7	7.178
MONDAY 6.					WEDNESDAY 8.				
0	19 41 1.94	2.3522	S. 20 54 9.7	2.680	0	21 28 17.85	2.1128	S. 16 47 10.8	7.251
1	19 43 22.94	2.3478	20 51 25.4	2.797	1	21 30 24.47	2.1079	16 39 53.5	7.324
2	19 45 43.67	2.3433	20 48 34.0	2.913	2	21 32 30.80	2.1029	16 32 31.9	7.396
3	19 48 4.13	2.3388	20 45 35.7	3.028	3	21 34 36.83	2.0980	16 25 6.1	7.466
4	19 50 24.32	2.3342	20 42 30.6	3.142	4	21 36 42.56	2.0931	16 17 36.0	7.535
5	19 52 44.23	2.3296	20 39 18.7	3.255	5	21 38 48.00	2.0883	16 10 1.8	7.604
6	19 55 3.87	2.3249	20 36 0.0	3.367	6	21 40 53.15	2.0835	16 2 23.5	7.672
7	19 57 23.22	2.3202	20 32 34.6	3.479	7	21 42 58.01	2.0787	15 54 41.2	7.739
8	19 59 42.29	2.3155	20 29 2.5	3.589	8	21 45 2.59	2.0739	15 46 54.8	7.805
9	20 2 1.07	2.3107	20 25 23.8	3.699	9	21 47 6.88	2.0691	15 39 4.5	7.870
10	20 4 19.57	2.3059	20 21 38.6	3.808	10	21 49 10.88	2.0644	15 31 10.4	7.934
11	20 6 37.78	2.3010	20 17 46.8	3.917	11	21 51 14.60	2.0597	15 23 12.5	7.998
12	20 8 55.69	2.2961	20 13 48.6	4.024	12	21 53 18.04	2.0550	15 15 10.7	8.061
13	20 11 13.31	2.2912	20 9 44.0	4.129	13	21 55 21.20	2.0504	15 7 5.2	8.122
14	20 13 30.63	2.2863	20 5 33.1	4.234	14	21 57 24.09	2.0458	14 58 56.1	8.183
15	20 15 47.66	2.2813	20 1 15.9	4.339	15	21 59 26.70	2.0413	14 50 43.3	8.243
16	20 18 4.39	2.2763	19 56 52.4	4.443	16	22 1 29.04	2.0368	14 42 26.9	8.302
17	20 20 20.82	2.2713	19 52 22.7	4.545	17	22 3 31.11	2.0323	14 34 7.0	8.361
18	20 22 36.95	2.2663	19 47 47.0	4.646	18	22 5 32.92	2.0278	14 25 43.6	8.418
19	20 24 52.78	2.2612	19 43 5.2	4.747	19	22 7 34.46	2.0234	14 17 16.8	8.475
20	20 27 8.30	2.2562	19 38 17.4	4.847	20	22 9 35.73	2.0191	14 8 46.6	8.531
21	20 29 23.52	2.2511	19 33 23.7	4.945	21	22 11 36.74	2.0148	14 0 13.1	8.586
22	20 31 38.43	2.2460	19 28 24.0	5.043	22	22 13 37.50	2.0105	13 51 36.3	8.640
23	20 33 53.03	2.2408	19 23 18.5	5.140	23	22 15 38.00	2.0063	13 42 56.3	8.693
24	20 36 7.33	2.2357	S. 19 18 7.2	5.236	24	22 17 38.25	2.0021	S. 13 34 13.1	8.746

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
THURSDAY 9.					SATURDAY 11.				
0	22 17 38.25	2.0021	S. 13° 34' 13.1"	8.746	0	23 49 48.93	1.8590	S. 5° 47' 41.0"	10.434
1	22 19 38.25	1.9979	13 25 26.8	8.796	1	23 51 40.42	1.8573	5 37 14.3	10.454
2	22 21 38.00	1.9938	13 16 37.3	8.849	2	23 53 31.80	1.8557	5 26 46.5	10.473
3	22 23 37.51	1.9897	13 7 44.8	8.899	3	23 55 23.09	1.8542	5 16 17.6	10.491
4	22 25 36.77	1.9857	12 58 49.4	8.943	4	23 57 14.30	1.8527	5 5 47.6	10.509
5	22 27 35.79	1.9817	12 49 51.0	8.998	5	23 59 5.42	1.8513	4 55 16.6	10.526
6	22 29 34.57	1.9778	12 40 49.7	9.046	6	0 0 56.46	1.8500	4 44 44.5	10.543
7	22 31 33.12	1.9739	12 31 45.6	9.093	7	0 2 47.42	1.8487	4 34 11.4	10.559
8	22 33 31.44	1.9701	12 22 38.6	9.139	8	0 4 38.20	1.8474	4 23 37.4	10.574
9	22 35 29.53	1.9663	12 13 28.8	9.185	9	0 6 29.11	1.8461	4 13 2.5	10.589
10	22 37 27.39	1.9625	12 4 16.4	9.230	10	0 8 19.85	1.8451	4 2 26.7	10.603
11	22 39 25.03	1.9588	11 55 1.3	9.274	11	0 10 10.52	1.8440	3 51 50.1	10.617
12	22 41 22.45	1.9551	11 45 43.5	9.317	12	0 12 1.13	1.8430	3 41 12.7	10.630
13	22 43 19.65	1.9515	11 36 23.2	9.360	13	0 13 51.68	1.8421	3 30 34.5	10.643
14	22 45 16.63	1.9480	11 27 0.3	9.402	14	0 15 42.18	1.8412	3 19 55.5	10.655
15	22 47 13.40	1.9445	11 17 34.9	9.443	15	0 17 32.63	1.8403	3 9 15.8	10.667
16	22 49 9.97	1.9411	11 8 7.1	9.483	16	0 19 23.02	1.8395	2 58 35.5	10.678
17	22 51 6.33	1.9377	10 58 36.9	9.523	17	0 21 13.37	1.8386	2 47 54.5	10.688
18	22 53 2.49	1.9343	10 49 4.3	9.563	18	0 23 3.68	1.8382	2 37 13.0	10.696
19	22 54 58.45	1.9310	10 39 29.4	9.602	19	0 24 53.95	1.8376	2 26 30.9	10.707
20	22 56 54.21	1.9278	10 29 52.1	9.640	20	0 26 44.19	1.8371	2 15 48.2	10.716
21	22 58 49.78	1.9246	10 20 12.6	9.677	21	0 28 34.40	1.8366	2 5 5.0	10.724
22	23 0 45.16	1.9214	10 10 30.9	9.713	22	0 30 24.58	1.8362	1 54 21.3	10.732
23	23 2 40.35	1.9183	S. 10° 0' 47.1"	9.748	23	0 32 14.73	1.8358	S. 1° 43' 37.1"	10.739
FRIDAY 10.					SUNDAY 12.				
0	23 4 35.36	1.9153	S. 9° 51' 1.1"	9.783	0	0 34 4.87	1.8353	S. 1° 32' 52.6"	10.746
1	23 6 30.19	1.9123	9 41 13.0	9.818	1	0 35 54.99	1.8352	1 22 7.7	10.752
2	23 8 24.84	1.9094	9 31 22.9	9.852	2	0 37 45.09	1.8350	1 11 22.4	10.757
3	23 10 19.32	1.9065	9 21 30.8	9.885	3	0 39 35.19	1.8349	1 0 36.8	10.762
4	23 12 13.62	1.9037	9 11 36.7	9.917	4	0 41 25.28	1.8349	0 49 51.0	10.766
5	23 14 7.76	1.9009	9 1 40.7	9.949	5	0 43 15.37	1.8349	0 39 5.0	10.769
6	23 16 1.73	1.8982	8 51 42.8	9.980	6	0 45 5.47	1.8349	0 28 18.7	10.772
7	23 17 55.54	1.8955	8 41 43.1	10.011	7	0 46 55.56	1.8349	0 17 32.3	10.775
8	23 19 49.19	1.8929	8 31 41.5	10.041	8	0 48 45.66	1.8351	S. 0° 6' 45.7"	10.777
9	23 21 42.69	1.8904	8 21 38.2	10.070	9	0 50 35.77	1.8353	N. 0° 4' 1.0"	10.779
10	23 23 36.04	1.8879	8 11 33.1	10.099	10	0 52 25.90	1.8356	0 14 47.8	10.780
11	23 25 29.24	1.8855	8 1 26.3	10.127	11	0 54 16.05	1.8359	0 25 34.6	10.780
12	23 27 22.30	1.8831	7 51 17.9	10.154	12	0 56 6.21	1.8363	0 36 21.4	10.780
13	23 29 15.21	1.8808	7 41 7.9	10.181	13	0 57 56.40	1.8368	0 47 8.2	10.779
14	23 31 7.99	1.8785	7 30 56.2	10.207	14	0 59 46.62	1.8373	0 57 54.9	10.778
15	23 33 0.63	1.8763	7 20 43.0	10.232	15	1 1 36.87	1.8378	1 8 41.5	10.776
16	23 34 53.14	1.8742	7 10 28.4	10.257	16	1 3 27.15	1.8384	1 19 28.0	10.774
17	23 36 45.53	1.8721	7 0 12.3	10.281	17	1 5 17.47	1.8391	1 30 14.3	10.771
18	23 38 37.79	1.8700	6 49 54.7	10.305	18	1 7 7.84	1.8396	1 41 0.5	10.767
19	23 40 29.93	1.8680	6 39 35.7	10.328	19	1 8 58.25	1.8406	1 51 46.4	10.763
20	23 42 21.95	1.8661	6 29 15.4	10.351	20	1 10 48.71	1.8414	2 2 32.0	10.758
21	23 44 13.86	1.8642	6 18 53.7	10.373	21	1 12 39.22	1.8423	2 13 17.3	10.753
22	23 46 5.65	1.8624	6 8 30.7	10.394	22	1 14 29.79	1.8433	2 24 2.3	10.747
23	23 47 57.34	1.8607	5 58 6.5	10.414	23	1 16 20.42	1.8443	2 34 46.9	10.740
24	23 49 48.93	1.8590	S. 5° 47' 41.0"	10.434	24	1 18 11.11	1.8454	N. 2° 45' 31.1"	10.733



## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
MONDAY 13.					WEDNESDAY 15.				
0	1 <sup>h</sup> 18 <sup>m</sup> 11.11	1.8454	N. 2 <sup>°</sup> 45' 31.1"	10.733	0	2 <sup>h</sup> 49 <sup>m</sup> 1.03	1.9588	N. 11 <sup>°</sup> 0' 32.3"	9.632
1	1 20 1.87	1.8465	2 56 14.8	10.725	1	2 50 58.66	1.9623	11 10 9.0	0.592
2	1 21 52.69	1.8477	3 6 58.1	10.717	2	2 52 56.51	1.9659	11 19 43.3	9.551
3	1 23 43.59	1.8489	3 17 40.8	10.708	3	2 54 54.58	1.9696	11 29 15.1	9.509
4	1 25 34.56	1.8502	3 28 23.0	10.698	4	2 56 52.86	1.9733	11 38 44.4	9.466
5	1 27 25.61	1.8515	3 39 4.6	10.688	5	2 58 51.36	1.9769	11 48 11.1	0.423
6	1 29 16.74	1.8529	3 49 45.6	10.678	6	3 0 50.09	1.9806	11 57 35.1	9.379
7	1 31 7.96	1.8544	4 0 25.9	10.667	7	3 2 49.04	1.9844	12 6 56.4	9.333
8	1 32 59.27	1.8559	4 11 5.6	10.655	8	3 4 48.22	1.9882	12 16 15.0	9.286
9	1 34 50.67	1.8574	4 21 44.5	10.642	9	3 6 47.63	1.9921	12 25 30.8	9.239
10	1 36 42.16	1.8591	4 32 22.6	10.629	10	3 8 47.27	1.9959	12 34 43.7	9.191
11	1 38 33.75	1.8608	4 42 59.9	10.615	11	3 10 47.14	1.9998	12 43 53.8	9.143
12	1 40 25.45	1.8625	4 53 36.4	10.601	12	3 12 47.25	2.0038	12 53 0.9	9.093
13	1 42 17.26	1.8643	5 4 12.0	10.586	13	3 14 47.60	2.0078	13 2 5.0	9.043
14	1 44 9.17	1.8661	5 14 46.7	10.570	14	3 16 48.18	2.0118	13 11 6.1	8.992
15	1 46 1.19	1.8680	5 25 20.4	10.553	15	3 18 49.01	2.0159	13 20 4.1	8.940
16	1 47 53.33	1.8700	5 35 53.1	10.536	16	3 20 50.09	2.0200	13 28 58.9	8.887
17	1 49 45.59	1.8720	5 46 24.8	10.519	17	3 22 51.41	2.0241	13 37 50.6	8.834
18	1 51 37.97	1.8740	5 56 55.4	10.501	18	3 24 52.98	2.0282	13 46 39.0	8.779
19	1 53 30.47	1.8761	6 7 24.9	10.482	19	3 26 54.80	2.0323	13 55 24.1	8.723
20	1 55 23.10	1.8783	6 17 53.2	10.462	20	3 28 56.86	2.0365	14 4 5.8	8.667
21	1 57 15.86	1.8805	6 28 20.3	10.442	21	3 30 59.18	2.0407	14 12 44.1	8.610
22	1 59 8.76	1.8828	6 38 46.3	10.421	22	3 33 1.75	2.0450	14 21 19.0	8.552
23	2 1 1.79	1.8851	N. 6 49 11.0	10.400	23	3 35 4.58	2.0493	N. 14 29 50.3	8.493
TUESDAY 14.					THURSDAY 16.				
0	2 2 54.97	1.8874	N. 6 59 34.3	10.378	0	3 37 7.67	2.0536	N. 14 38 18.1	8.433
1	2 4 48.29	1.8896	7 9 56.3	10.355	1	3 39 11.01	2.0579	14 46 42.3	8.379
2	2 6 41.75	1.8923	7 20 16.9	10.331	2	3 41 14.62	2.0623	14 55 2.7	8.310
3	2 8 35.36	1.8948	7 30 36.0	10.307	3	3 43 18.49	2.0667	15 3 19.4	8.248
4	2 10 29.13	1.8974	7 40 53.7	10.282	4	3 45 22.62	2.0710	15 11 32.4	8.184
5	2 12 23.06	1.9001	7 51 9.9	10.257	5	3 47 27.01	2.0754	15 19 41.5	8.120
6	2 14 17.14	1.9027	8 1 24.5	10.230	6	3 49 31.67	2.0798	15 27 46.8	8.054
7	2 16 11.38	1.9054	8 11 37.5	10.203	7	3 51 36.60	2.0843	15 35 48.1	7.988
8	2 18 5.79	1.9082	8 21 48.9	10.175	8	3 53 41.79	2.0887	15 43 45.4	7.921
9	2 20 0.37	1.9110	8 31 58.6	10.147	9	3 55 47.25	2.0932	15 51 38.6	7.853
10	2 21 55.11	1.9139	8 42 6.6	10.118	10	3 57 52.97	2.0977	15 59 27.7	7.783
11	2 23 50.03	1.9168	8 52 12.8	10.088	11	3 59 58.96	2.1022	16 7 12.6	7.713
12	2 25 45.13	1.9198	9 2 17.2	10.058	12	4 2 5.23	2.1067	16 14 53.3	7.642
13	2 27 40.41	1.9228	9 12 19.7	10.027	13	4 4 11.77	2.1112	16 22 29.7	7.571
14	2 29 35.86	1.9258	9 22 20.4	9.995	14	4 6 18.57	2.1157	16 30 1.8	7.498
15	2 31 31.50	1.9289	9 32 19.1	9.962	15	4 8 25.65	2.1203	16 37 29.5	7.425
16	2 33 27.33	1.9321	9 42 15.8	9.928	16	4 10 33.00	2.1248	16 44 52.8	7.350
17	2 35 23.35	1.9353	9 52 10.4	9.893	17	4 12 40.63	2.1294	16 52 11.6	7.275
18	2 37 19.56	1.9385	10 2 3.0	9.858	18	4 14 48.53	2.1339	16 59 25.8	7.199
19	2 39 15.97	1.9418	10 11 53.5	9.823	19	4 16 56.70	2.1385	17 6 35.4	7.122
20	2 41 12.57	1.9451	10 21 41.8	9.786	20	4 19 5.15	2.1430	17 13 40.4	7.043
21	2 43 9.38	1.9485	10 31 27.9	9.749	21	4 21 13.87	2.1476	17 20 40.6	6.963
22	2 45 6.39	1.9519	10 41 11.7	9.711	22	4 23 22.86	2.1522	17 27 36.0	6.883
23	2 47 3.61	1.9553	10 50 53.2	9.672	23	4 25 32.13	2.1568	17 34 26.6	6.803
24	2 49 1.03	1.9588	N. 11 0 32.3	9.632	24	4 27 41.67	2.1613	N. 17 41 12.3	6.721

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
FRIDAY 17.					SUNDAY 19.				
0	4 27 41.67	2.1613	N.17° 41' 12.3"	6.721	0	6 16 17.89	2.3483	N.21° 12' 34.6"	1.779
1	4 29 51.49	2.1659	17 47 53.0	6.638	1	6 18 38.93	2.3521	21 14 17.8	1.659
2	4 32 1.58	2.1704	17 54 28.8	6.554	2	6 21 0.14	2.3547	21 15 53.7	1.538
3	4 34 11.94	2.1749	18 0 59.5	6.469	3	6 23 21.50	2.3573	21 17 22.3	1.417
4	4 36 22.57	2.1794	18 7 25.1	6.384	4	6 25 43.01	2.3598	21 18 43.7	1.295
5	4 38 33.47	2.1840	18 13 45.6	6.298	5	6 28 4.67	2.3622	21 19 57.7	1.172
6	4 40 44.65	2.1885	18 20 0.8	6.210	6	6 30 26.48	2.3646	21 21 4.3	1.049
7	4 42 56.10	2.1930	18 26 10.7	6.121	7	6 32 48.43	2.3669	21 22 3.5	0.926
8	4 45 7.81	2.1975	18 32 15.3	6.032	8	6 35 10.51	2.3691	21 22 55.4	0.802
9	4 47 19.80	2.2020	18 38 14.5	5.942	9	6 37 32.72	2.3713	21 23 39.9	0.678
10	4 49 32.05	2.2064	18 44 8.3	5.850	10	6 39 55.06	2.3733	21 24 16.8	0.553
11	4 51 44.57	2.2108	18 49 56.6	5.758	11	6 42 17.52	2.3753	21 24 46.2	0.428
12	4 53 57.35	2.2153	18 55 39.3	5.665	12	6 44 40.10	2.3772	21 25 8.2	0.303
13	4 56 10.40	2.2197	19 1 16.4	5.572	13	6 47 2.79	2.3791	21 25 22.7	0.178
14	4 58 23.71	2.2241	19 6 47.9	5.477	14	6 49 25.59	2.3809	21 25 29.6	0.053
15	5 0 37.29	2.2284	19 12 13.7	5.381	15	6 51 48.50	2.3826	21 25 29.0	0.073
16	5 2 51.12	2.2327	19 17 33.6	5.284	16	6 54 11.50	2.3842	21 25 20.8	0.199
17	5 5 5.21	2.2370	19 22 47.7	5.187	17	6 56 34.60	2.3857	21 25 5.0	0.326
18	5 7 19.56	2.2413	19 27 56.0	5.088	18	6 58 57.79	2.3871	21 24 41.7	0.453
19	5 9 34.16	2.2455	19 32 58.4	4.989	19	7 1 21.06	2.3885	21 24 10.7	0.580
20	5 11 49.02	2.2497	19 37 54.7	4.889	20	7 3 44.41	2.3898	21 23 32.1	0.707
21	5 14 4.13	2.2539	19 42 45.0	4.788	21	7 6 7.84	2.3911	21 22 45.9	0.834
22	5 16 19.49	2.2581	19 47 29.3	4.686	22	7 8 31.34	2.3922	21 21 52.0	0.961
23	5 18 35.10	2.2622	N.19° 52' 7.5"	4.584	23	7 10 54.90	2.3933	N.21° 20' 50.5"	1.089
SATURDAY 18.					MONDAY 20.				
0	5 20 50.95	2.2663	N.19° 56' 39.4"	4.481	0	7 13 18.53	2.3942	N.21° 19' 41.3"	1.216
1	5 23 7.05	2.2703	20 1 5.1	4.377	1	7 15 42.21	2.3951	21 18 24.5	1.344
2	5 25 23.38	2.2743	20 5 24.6	4.272	2	7 18 5.94	2.3959	21 17 0.0	1.472
3	5 27 39.95	2.2782	20 9 37.7	4.166	3	7 20 29.72	2.3967	21 15 27.8	1.600
4	5 29 56.76	2.2821	20 13 44.5	4.060	4	7 22 53.54	2.3973	21 13 48.0	1.728
5	5 32 13.80	2.2859	20 17 44.9	3.953	5	7 25 17.40	2.3979	21 12 0.5	1.856
6	5 34 31.07	2.2898	20 21 38.8	3.844	6	7 27 41.29	2.3984	21 10 5.3	1.984
7	5 36 48.57	2.2936	20 25 26.2	3.735	7	7 30 5.21	2.3988	21 8 2.4	2.112
8	5 39 6.30	2.2973	20 29 7.0	3.625	8	7 32 29.15	2.3992	21 5 51.9	2.240
9	5 41 24.25	2.3009	20 32 41.2	3.515	9	7 34 53.11	2.3995	21 3 33.7	2.367
10	5 43 42.41	2.3046	20 36 8.8	3.404	10	7 37 17.09	2.3997	21 1 7.9	2.495
11	5 46 0.79	2.3082	20 39 29.7	3.293	11	7 39 41.08	2.3998	20 58 34.4	2.622
12	5 48 19.39	2.3117	20 42 43.9	3.180	12	7 42 5.07	2.3998	20 55 53.3	2.750
13	5 50 38.20	2.3152	20 45 51.3	3.067	13	7 44 29.06	2.3998	20 53 4.5	2.877
14	5 52 57.21	2.3186	20 48 51.9	2.953	14	7 46 53.04	2.3997	20 50 8.1	3.004
15	5 55 16.42	2.3219	20 51 45.6	2.838	15	7 49 17.01	2.3995	20 47 4.1	3.130
16	5 57 35.84	2.3252	20 54 32.5	2.723	16	7 51 40.98	2.3992	20 43 52.5	3.257
17	5 59 55.45	2.3284	20 57 12.4	2.607	17	7 54 4.93	2.3989	20 40 33.3	3.383
18	6 2 15.25	2.3316	20 59 45.3	2.491	18	7 56 28.85	2.3985	20 37 6.6	3.509
19	6 4 35.24	2.3348	21 2 11.3	2.374	19	7 58 52.75	2.3981	20 33 32.3	3.635
20	6 6 55.42	2.3378	21 4 30.2	2.256	20	8 1 16.62	2.3975	20 29 50.4	3.760
21	6 9 15.78	2.3408	21 6 42.0	2.138	21	8 3 40.45	2.3968	20 26 1.0	3.885
22	6 11 36.31	2.3437	21 8 46.7	2.019	22	8 6 4.24	2.3961	20 22 4.2	4.010
23	6 13 57.01	2.3465	21 10 44.2	1.899	23	8 8 27.99	2.3954	20 17 59.9	4.134
24	6 16 17.89	2.3493	N.21° 12' 34.6"	1.779	24	8 10 51.69	2.3946	N.20° 13' 48.1"	4.258

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
TUESDAY 21.					THURSDAY 23.				
0	8 10 51.69	2.3946	N.20 13 48.1	4.258	0	10 3 52.47	2.3012	N.14 37 29.9	9.462
1	8 13 15.34	2.3937	20 9 28.9	4.389	1	10 6 10.47	2.2987	14 27 59.5	9.550
2	8 15 38.93	2.3927	20 5 2.2	4.505	2	10 8 28.31	2.2963	14 18 23.9	9.636
3	8 18 2.46	2.3917	20 0 28.2	4.628	3	10 10 46.01	2.2938	14 8 43.2	9.722
4	8 20 25.94	2.3906	19 55 46.8	4.750	4	10 13 3.56	2.2913	13 58 57.3	9.806
5	8 22 49.35	2.3895	19 50 58.1	4.872	5	10 15 20.96	2.2888	13 49 6.4	9.889
6	8 25 12.68	2.3883	19 46 2.1	4.994	6	10 17 38.22	2.2863	13 39 10.6	9.971
7	8 27 35.94	2.3870	19 40 58.8	5.115	7	10 19 55.33	2.2839	13 29 9.9	10.052
8	8 29 59.12	2.3857	19 35 48.3	5.236	8	10 22 12.29	2.2815	13 19 4.3	10.132
9	8 32 22.22	2.3843	19 30 30.5	5.356	9	10 24 29.11	2.2791	13 8 53.9	10.212
10	8 34 45.24	2.3829	19 25 5.6	5.475	10	10 26 45.78	2.2767	12 58 38.9	10.290
11	8 37 8.17	2.3814	19 19 33.6	5.593	11	10 29 2.31	2.2743	12 48 19.2	10.367
12	8 39 31.01	2.3799	19 13 54.4	5.712	12	10 31 18.69	2.2719	12 37 54.9	10.443
13	8 41 53.76	2.3783	19 8 8.1	5.830	13	10 33 34.93	2.2695	12 27 26.1	10.517
14	8 44 16.41	2.3766	19 2 14.8	5.947	14	10 35 51.03	2.2672	12 16 52.8	10.590
15	8 46 38.96	2.3749	18 56 14.5	6.063	15	10 38 6.99	2.2649	12 6 15.1	10.663
16	8 49 1.40	2.3732	18 50 7.2	6.179	16	10 40 22.82	2.2626	11 55 33.2	10.735
17	8 51 23.74	2.3714	18 43 53.0	6.294	17	10 42 38.51	2.2603	11 44 47.0	10.806
18	8 53 45.97	2.3696	18 37 31.9	6.408	18	10 44 54.06	2.2580	11 33 56.5	10.875
19	8 56 8.09	2.3677	18 31 4.0	6.522	19	10 47 9.48	2.2558	11 23 1.9	10.943
20	8 58 30.09	2.3658	18 24 29.3	6.635	20	10 49 24.76	2.2536	11 12 3.3	11.010
21	9 0 51.98	2.3638	18 17 47.8	6.747	21	10 51 39.91	2.2514	11 1 0.7	11.076
22	9 3 13.75	2.3618	18 10 59.6	6.859	22	10 53 54.94	2.2493	10 49 54.2	11.141
23	9 5 35.40	2.3598	N.18 4 4.7	6.970	23	10 56 9.84	2.2472	N.10 38 43.8	11.205
WEDNESDAY 22.					FRIDAY 24.				
0	9 7 56.93	2.3577	N.17 57 3.2	7.080	0	10 58 24.61	2.2451	N.10 27 29.6	11.268
1	9 10 18.33	2.3556	17 49 55.1	7.189	1	11 0 39.26	2.2431	10 16 11.7	11.329
2	9 12 39.60	2.3535	17 42 40.5	7.297	2	11 2 53.78	2.2411	10 4 50.1	11.389
3	9 15 0.74	2.3513	17 35 19.4	7.405	3	11 5 8.18	2.2391	9 53 24.9	11.448
4	9 17 21.76	2.3491	17 27 51.9	7.512	4	11 7 22.47	2.2371	9 41 56.3	11.506
5	9 19 42.64	2.3469	17 20 18.0	7.618	5	11 9 36.64	2.2352	9 30 24.2	11.563
6	9 22 3.39	2.3446	17 12 37.7	7.723	6	11 11 50.69	2.2333	9 18 48.7	11.619
7	9 24 24.00	2.3423	17 4 51.1	7.827	7	11 14 4.63	2.2314	9 7 9.9	11.674
8	9 26 44.47	2.3400	16 56 58.4	7.930	8	11 16 18.46	2.2296	8 55 27.8	11.728
9	9 29 4.80	2.3377	16 48 59.5	8.033	9	11 18 32.18	2.2278	8 43 42.5	11.780
10	9 31 25.00	2.3354	16 40 54.4	8.135	10	11 20 45.80	2.2261	8 31 54.2	11.831
11	9 33 45.05	2.3330	16 32 43.2	8.237	11	11 22 59.31	2.2244	8 20 2.8	11.881
12	9 36 4.96	2.3306	16 24 26.0	8.337	12	11 25 12.73	2.2228	8 8 8.5	11.930
13	9 38 24.72	2.3282	16 16 2.8	8.436	13	11 27 26.05	2.2212	7 56 11.3	11.977
14	9 40 44.34	2.3258	16 7 33.7	8.534	14	11 29 39.27	2.2196	7 44 11.2	12.023
15	9 43 3.82	2.3234	15 58 58.8	8.631	15	11 31 52.40	2.2180	7 32 8.4	12.069
16	9 45 23.15	2.3210	15 50 18.0	8.727	16	11 34 5.43	2.2165	7 20 2.9	12.114
17	9 47 42.33	2.3185	15 41 31.5	8.822	17	11 36 18.38	2.2151	7 7 54.8	12.157
18	9 50 1.37	2.3161	15 32 39.3	8.916	18	11 38 31.24	2.2137	6 55 44.1	12.199
19	9 52 20.26	2.3136	15 23 41.5	9.010	19	11 40 44.02	2.2123	6 43 30.9	12.239
20	9 54 39.00	2.3111	15 14 38.1	9.102	20	11 42 56.72	2.2110	6 31 15.4	12.278
21	9 56 57.59	2.3086	15 5 29.2	9.194	21	11 45 9.35	2.2098	6 18 57.5	12.317
22	9 59 16.03	2.3062	14 56 14.8	9.284	22	11 47 21.90	2.2086	6 6 37.3	12.355
23	10 1 34.32	2.3037	14 46 55.0	9.374	23	11 49 34.38	2.2074	5 54 14.9	12.391
24	10 3 52.47	2.3012	N.14 37 29.9	9.462	24	11 51 46.79	2.2063	N. 5 41 50.4	12.426

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION.

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
SATURDAY 25.					MONDAY 27.				
0	11 51 46.79	2.2063	N. 5 41' 50.4"	12.426	0	13 37 23.72	2.2152	S. 4 31' 57.9"	12.688
1	11 53 59.14	2.2053	5 29 23.8	12.450	1	13 39 36.68	2.2167	4 44 38.0	12.657
2	11 56 11.42	2.2043	5 16 55.3	12.491	2	13 41 49.73	2.2182	4 57 16.7	12.631
3	11 58 23.64	2.2033	5 4 24.8	12.533	3	13 44 2.87	2.2198	5 9 53.8	12.603
4	12 0 35.81	2.2023	4 51 52.5	12.553	4	13 46 16.11	2.2215	5 22 29.1	12.574
5	12 2 47.92	2.2014	4 39 18.5	12.582	5	13 48 29.45	2.2232	5 35 2.7	12.545
6	12 4 59.98	2.2006	4 26 42.7	12.610	6	13 50 42.89	2.2250	5 47 34.5	12.514
7	12 7 11.99	2.1998	4 14 5.3	12.637	7	13 52 56.44	2.2268	6 0 4.4	12.482
8	12 9 23.96	2.1991	4 1 26.3	12.662	8	13 55 10.10	2.2286	6 12 32.3	12.448
9	12 11 35.89	2.1985	3 48 45.8	12.686	9	13 57 23.87	2.2305	6 24 58.2	12.413
10	12 13 47.78	2.1979	3 36 4.0	12.709	10	13 59 37.76	2.2324	6 37 21.9	12.378
11	12 15 59.64	2.1973	3 23 20.8	12.731	11	14 1 51.76	2.2343	6 49 43.4	12.339
12	12 18 11.46	2.1968	3 10 36.3	12.751	12	14 4 5.88	2.2363	7 2 2.6	12.301
13	12 20 23.25	2.1963	2 57 50.6	12.771	13	14 6 20.12	2.2384	7 14 19.5	12.261
14	12 22 35.02	2.1960	2 45 3.8	12.789	14	14 8 34.49	2.2405	7 26 33.9	12.220
15	12 24 46.77	2.1957	2 32 16.0	12.806	15	14 10 48.99	2.2427	7 38 45.8	12.177
16	12 26 58.50	2.1954	2 19 27.1	12.821	16	14 13 3.61	2.2448	7 50 55.1	12.133
17	12 29 10.22	2.1952	2 6 37.3	12.836	17	14 15 18.36	2.2470	8 3 1.8	12.088
18	12 31 21.92	2.1950	1 53 46.8	12.849	18	14 17 33.25	2.2493	8 15 5.7	12.042
19	12 33 33.62	2.1949	1 40 55.5	12.861	19	14 19 48.28	2.2517	8 27 6.8	11.994
20	12 35 45.31	2.1948	1 28 3.5	12.872	20	14 22 3.45	2.2540	8 39 5.0	11.945
21	12 37 57.00	2.1948	1 15 10.8	12.883	21	14 24 18.76	2.2563	8 51 0.2	11.895
22	12 40 8.68	2.1948	1 2 17.6	12.891	22	14 26 34.21	2.2587	9 2 52.4	11.844
23	12 42 20.37	2.1949	N. 0 49 23.9	12.898	23	14 28 49.81	2.2612	S. 9 14 41.5	11.791
SUNDAY 26.					TUESDAY 28.				
0	12 44 32.07	2.1951	N. 0 36 29.8	12.904	0	14 31 5.55	2.2637	S. 9 26 27.3	11.737
1	12 46 43.78	2.1953	0 23 35.4	12.909	1	14 33 21.44	2.2662	9 38 9.9	11.682
2	12 48 55.51	2.1955	N. 0 10 40.7	12.913	2	14 35 37.49	2.2687	9 49 49.2	11.626
3	12 51 7.25	2.1958	S. 0 2 14.1	12.915	3	14 37 53.69	2.2713	10 1 25.0	11.568
4	12 53 19.01	2.1962	0 15 9.1	12.917	4	14 40 10.05	2.2739	10 12 57.3	11.509
5	12 55 30.79	2.1967	0 28 4.1	12.917	5	14 42 26.56	2.2765	10 24 26.0	11.448
6	12 57 42.61	2.1972	0 40 59.1	12.916	6	14 44 43.23	2.2791	10 35 51.1	11.386
7	12 59 54.46	2.1977	0 53 54.0	12.913	7	14 47 0.06	2.2818	10 47 12.5	11.324
8	13 2 6.34	2.1983	1 6 48.7	12.909	8	14 49 17.05	2.2845	10 58 30.0	11.260
9	13 4 18.26	2.1989	1 19 43.1	12.904	9	14 51 34.21	2.2873	11 9 43.7	11.195
10	13 6 30.21	2.1996	1 32 37.2	12.898	10	14 53 51.53	2.2900	11 20 53.4	11.129
11	13 8 42.21	2.2004	1 45 30.9	12.891	11	14 56 9.02	2.2928	11 31 59.1	11.061
12	13 10 54.26	2.2012	1 58 24.1	12.883	12	14 58 26.67	2.2956	11 43 0.7	10.992
13	13 13 6.36	2.2021	2 11 16.8	12.873	13	15 0 44.49	2.2984	11 53 58.1	10.922
14	13 15 18.51	2.2030	2 24 8.8	12.861	14	15 3 2.48	2.3012	12 4 51.3	10.851
15	13 17 30.72	2.2040	2 37 0.1	12.848	15	15 5 20.64	2.3041	12 15 40.1	10.778
16	13 19 42.99	2.2051	2 49 50.6	12.834	16	15 7 38.97	2.3069	12 26 24.6	10.704
17	13 21 55.33	2.2062	3 2 40.2	12.820	17	15 9 57.47	2.3098	12 37 4.6	10.628
18	13 24 7.73	2.2073	3 15 29.0	12.805	18	15 12 16.15	2.3127	12 47 40.0	10.551
19	13 26 20.20	2.2085	3 28 16.8	12.788	19	15 14 35.00	2.3156	12 58 10.8	10.474
20	13 28 32.75	2.2097	3 41 3.5	12.769	20	15 16 54.02	2.3185	13 8 36.9	10.395
21	13 30 45.37	2.2110	3 53 49.0	12.748	21	15 19 13.22	2.3214	13 18 58.2	10.315
22	13 32 58.07	2.2123	4 6 33.3	12.727	22	15 21 32.59	2.3243	13 29 14.7	10.234
23	13 35 10.85	2.2137	4 19 16.3	12.705	23	15 23 52.13	2.3272	13 39 26.3	10.152
24	13 37 23.72	2.2152	S. 4 31 57.9	12.682	24	15 26 11.85	2.3301	S. 13 49 32.9	10.068

## GREENWICH MEAN TIME.

## THE MOON'S RIGHT ASCENSION AND DECLINATION

Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.	Hour.	Right Ascension.	Diff. for 1 m.	Declination.	Diff. for 1 m.
WEDNESDAY 29.					FRIDAY 31.				
0	15 <sup>h</sup> 26 <sup>m</sup> 11.85	2.3301	S. 13° 49' 32.9	10.068	0	17 <sup>h</sup> 21 <sup>m</sup> 4.17	2.4413	S. 19° 56' 2.7	4.850
1	15 28 31.74	2.3330	13 59 34.5	9.983	1	17 23 30.68	2.4424	20 0 49.8	4.722
2	15 30 51.81	2.3359	14 9 30.9	9.897	2	17 25 57.26	2.4434	20 5 29.3	4.594
3	15 33 12.06	2.3389	14 19 22.1	9.810	3	17 28 23.89	2.4443	20 10 1.1	4.465
4	15 35 32.48	2.3418	14 29 8.1	9.722	4	17 30 50.58	2.4451	20 14 25.1	4.336
5	15 37 53.08	2.3447	14 38 48.7	9.632	5	17 33 17.32	2.4459	20 18 41.4	4.206
6	15 40 13.85	2.3476	14 48 23.9	9.541	6	17 35 44.09	2.4466	20 22 49.8	4.076
7	15 42 34.79	2.3505	14 57 53.6	9.449	7	17 38 10.90	2.4473	20 26 50.4	3.945
8	15 44 55.91	2.3534	15 7 17.8	9.356	8	17 40 37.75	2.4477	20 30 43.2	3.814
9	15 47 17.20	2.3563	15 16 36.4	9.263	9	17 43 4.62	2.4481	20 34 28.1	3.683
10	15 49 38.67	2.3592	15 25 49.3	9.168	10	17 45 31.51	2.4484	20 38 5.2	3.552
11	15 52 0.31	2.3620	15 34 56.5	9.072	11	17 47 58.42	2.4486	20 41 34.4	3.420
12	15 54 22.11	2.3649	15 43 57.9	8.975	12	17 50 25.34	2.4487	20 44 55.6	3.288
13	15 56 44.08	2.3677	15 52 53.4	8.876	13	17 52 52.27	2.4488	20 48 8.9	3.156
14	15 59 6.23	2.3705	16 1 43.0	8.776	14	17 55 19.20	2.4488	20 51 14.3	3.024
15	16 1 28.54	2.3733	16 10 26.6	8.675	15	17 57 46.13	2.4487	20 54 11.7	2.891
16	16 3 51.02	2.3760	16 19 4.0	8.573	16	18 0 13.05	2.4485	20 57 1.2	2.758
17	16 6 13.66	2.3787	16 27 35.3	8.471	17	18 2 39.95	2.4483	20 59 42.7	2.625
18	16 8 36.46	2.3814	16 36 0.5	8.368	18	18 5 6.84	2.4479	21 2 16.2	2.492
19	16 10 59.42	2.3840	16 44 19.4	8.263	19	18 7 33.70	2.4475	21 4 41.7	2.359
20	16 13 22.54	2.3867	16 52 32.0	8.157	20	18 10 0.53	2.4469	21 6 59.2	2.226
21	16 15 45.82	2.3893	17 0 38.3	8.051	21	18 12 27.33	2.4463	21 9 8.8	2.093
22	16 18 9.25	2.3919	17 8 38.1	7.943	22	18 14 54.08	2.4455	21 11 10.3	1.960
23	16 20 32.84	2.3944	S. 17 16 31.4	7.834	23	18 17 20.79	2.4447	S. 21 13 3.8	1.826
THURSDAY 30.					SATURDAY, JANUARY 1.				
0	16 22 56.58	2.3969	S. 17 24 18.2	7.724	0	18 19 47.45	2.4438	S. 21 14 49.4	1.693
1	16 25 20.47	2.3993	17 31 58.4	7.614	PHASES OF THE MOON.				
2	16 27 44.50	2.4017	17 39 31.9	7.503					
3	16 30 8.68	2.4041	17 46 58.7	7.390					
4	16 32 33.00	2.4065	17 54 18.7	7.277					
5	16 34 57.46	2.4088	18 1 31.9	7.163	● New Moon, . . . <sup>d h m</sup> 2 22 41.4 ☽ First Quarter, . . . 10 11 11.5 ○ Full Moon, . . . 18 11 50.0 ☾ Last Quarter, . . . 25 14 34.0				
6	16 37 22.05	2.4110	18 8 38.2	7.048					
7	16 39 46.78	2.4132	18 15 37.6	6.932					
8	16 42 11.63	2.4153	18 22 30.0	6.815					
9	16 44 36.61	2.4174	18 29 15.4	6.698	☾ Apogee, . . . . . <sup>d h</sup> 12 3.2 ☾ Perigee, . . . . . 27 6.8				
10	16 47 1.72	2.4194	18 35 53.7	6.579					
11	16 49 26.94	2.4214	18 42 24.9	6.460					
12	16 51 52.28	2.4233	18 48 48.9	6.340					
13	16 54 17.73	2.4252	18 55 5.7	6.220					
14	16 56 43.30	2.4270	19 1 15.3	6.099					
15	16 59 8.97	2.4288	19 7 17.5	5.976					
16	17 1 34.75	2.4305	19 13 12.4	5.853					
17	17 4 0.62	2.4321	19 18 59.9	5.730					
18	17 6 26.59	2.4336	19 24 40.0	5.606					
19	17 8 52.65	2.4351	19 30 12.6	5.482					
20	17 11 18.80	2.4365	19 35 37.8	5.357					
21	17 13 45.03	2.4378	19 40 55.5	5.231					
22	17 16 11.34	2.4390	19 46 5.5	5.104					
23	17 18 37.72	2.4402	19 51 7.9	4.977					
24	17 21 4.17	2.4413	S. 19 56 2.7	4.850					

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
5	SUN W.	26° 42' 29"	2845	28° 15' 59"	2859	29° 49' 10"	2873	31° 22' 3"	2887
	Fomalhaut E.	55 37 46	2809	54 3 30	2841	52 29 55	2874	50 57 3	2908
	α Pegasi E.	72 3 44	2887	70 31 8	2911	68 59 3	2837	67 27 31	2964
6	SUN W.	39 1 41	2966	40 32 36	2983	42 3 10	3000	43 33 23	3017
	Mars W.	17 6 50	2922	18 38 41	2931	20 10 20	2941	21 41 47	2951
	Fomalhaut E.	43 24 34	3118	41 56 46	3169	40 30 0	3225	39 4 20	3285
	α Pegasi E.	59 58 54	3190	58 31 9	3157	57 4 8	3193	55 37 51	3232
	α Arietis E.	102 4 15	2754	100 28 47	2769	98 53 39	2785	97 18 51	2799
	Jupiter E.	108 59 10	2574	107 19 40	2591	105 40 33	2608	104 1 49	2624
7	SUN W.	50 59 15	3101	52 27 24	3118	53 55 12	3134	55 22 40	3150
	Mars W.	29 15 10	3090	30 44 58	3034	32 14 28	3050	33 43 39	3065
	Fomalhaut E.	32 15 38	3688	30 58 38	3797	29 43 33	3922	28 30 36	4065
	α Pegasi E.	48 38 44	3463	47 17 38	3519	45 57 35	3578	44 38 37	3640
	α Arietis E.	89 29 54	2880	87 57 9	2896	86 24 45	2912	84 52 41	2928
	Jupiter E.	95 53 39	2705	94 17 6	2721	92 40 54	2737	91 5 3	2752
8	SUN W.	62 35 15	3228	64 0 51	3242	65 26 10	3257	66 51 12	3271
	Mars W.	41 5 5	3137	42 32 30	3151	43 59 38	3164	45 26 30	3178
	α Aquilæ W.	36 3 56	5288	36 57 12	5192	37 52 33	4974	38 49 49	4943
	Venus W.	15 24 11	3268	16 49 0	3277	18 13 38	3288	19 38 4	3297
	α Arietis E.	77 17 30	3009	75 47 29	3025	74 17 47	3041	72 48 25	3057
	Jupiter E.	83 10 46	2826	81 36 52	2839	80 3 15	2853	78 29 56	2867
	Aldebaran E.	108 37 22	2648	107 3 57	2663	105 30 51	2676	103 58 2	2689
9	SUN W.	73 52 24	3335	75 15 55	3347	76 39 12	3358	78 2 16	3368
	Mars W.	52 36 55	3239	54 2 18	3251	55 27 27	3262	56 52 23	3271
	α Aquilæ W.	43 59 3	4390	45 4 33	4327	46 11 1	4268	47 18 23	4215
	Venus W.	26 37 18	3349	28 0 33	3359	29 23 36	3369	30 46 28	3379
	α Arietis E.	65 26 28	3136	63 59 2	3152	62 31 55	3168	61 5 7	3183
	Jupiter E.	70 47 30	2927	69 15 46	2939	67 44 16	2949	66 12 59	2960
	Aldebaran E.	96 17 56	2949	94 46 39	2960	93 15 36	2970	91 44 46	2980
10	SUN W.	84 54 49	3415	86 16 49	3423	87 38 40	3430	89 0 23	3436
	Mars W.	63 54 18	3316	65 18 11	3325	66 41 54	3332	68 5 29	3338
	α Aquilæ W.	53 6 22	4015	54 17 47	3986	55 29 40	3958	56 42 1	3933
	Venus W.	37 38 14	3420	39 0 8	3427	40 21 54	3433	41 43 33	3440
	α Arietis E.	53 55 53	3265	52 31 0	3282	51 6 27	3299	49 42 14	3317
	Jupiter E.	58 39 41	3005	57 9 34	3012	55 39 36	3019	54 9 47	3026
	Aldebaran E.	84 13 30	3023	82 43 46	3030	81 14 10	3036	79 44 42	3043
11	SUN W.	95 47 20	3461	97 8 28	3465	98 29 31	3468	99 50 31	3470
	Mars W.	75 1 50	3361	76 24 51	3365	77 47 48	3368	79 10 41	3370
	α Aquilæ W.	62 49 28	3833	64 3 56	3818	65 18 40	3803	66 33 39	3789
	Venus W.	48 30 15	3462	49 51 22	3464	51 12 26	3467	52 33 27	3470
	Fomalhaut W.	28 13 6	4260	29 20 36	4158	30 29 42	4089	31 40 14	3990
	α Arietis E.	42 46 41	3421	41 24 48	3446	40 3 23	3472	38 42 28	3500
	Jupiter E.	46 42 40	3054	45 13 34	3058	43 44 33	3062	42 15 37	3066
	Aldebaran E.	72 19 7	3066	70 50 16	3069	69 21 29	3072	67 52 45	3074
12	SUN W.	106 35 5	3474	107 55 58	3473	109 16 52	3471	110 37 48	3471
	Mars W.	86 4 42	3373	87 27 29	3372	88 50 17	3372	90 13 6	3370
	α Aquilæ W.	72 52 1	3729	74 8 17	3719	75 24 44	3709	76 41 21	3699
	Venus W.	59 18 10	3471	60 39 7	3469	62 0 6	3468	63 21 6	3465

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
5	SUN	W.	32° 54' 38"	2903	34° 26' 53"	2918	35° 58' 49"	2934	37° 30' 25"	2950
	Fomalhaut	E.	49 24 54	2945	47 53 32	2985	46 23 0	3026	44 53 20	3070
	α Pegasi	E.	65 56 33	2993	64 26 11	3032	62 56 26	3054	61 27 20	3087
6	SUN	W.	45 3 15	3034	46 32 46	3051	48 1 56	3067	49 30 46	3084
	Mars	W.	23 13 1	2964	24 43 59	2977	26 14 40	2991	27 45 4	3005
	Fomalhaut	E.	37 39 51	3351	36 16 38	3423	34 54 47	3501	33 34 24	3589
	α Pegasi	E.	54 12 20	3273	52 47 37	3318	51 23 46	3364	50 0 48	3411
	α Arietis	E.	95 44 22	2815	94 10 14	2831	92 36 27	2847	91 3 0	2863
	Jupiter	E.	102 23 27	2840	100 45 27	2857	99 7 50	2873	97 30 34	2889
7	SUN	W.	56 49 49	3166	58 16 39	3183	59 43 9	3198	61 9 21	3213
	Mars	W.	35 12 32	3079	36 41 7	3094	38 9 24	3109	39 37 23	3123
	Fomalhaut	E.	27 20 0	4228	26 12 0	4416	25 6 53	4636	24 4 59	4897
	α Pegasi	E.	43 20 46	3709	42 4 8	3782	40 48 47	3861	39 34 48	3946
	α Arietis	E.	83 20 58	2944	81 49 35	2961	80 18 33	2977	78 47 51	2993
	Jupiter	E.	89 29 32	2768	87 54 22	2782	86 19 31	2797	84 44 59	2811
8	SUN	W.	68 15 57	3265	69 40 26	3298	71 4 40	3311	72 28 3	3323
	Mars	W.	46 53 5	3192	48 19 24	3204	49 45 29	3216	51 11 19	3228
	α Aquilæ	W.	39 48 50	4730	40 49 24	4631	41 51 22	4542	42 54 37	4462
	Venus	W.	21 2 19	3307	22 26 22	3319	23 50 12	3328	25 13 51	3338
	α Arietis	E.	71 19 23	3073	69 50 40	3089	68 22 17	3105	66 54 13	3120
	Jupiter	E.	76 56 55	2890	75 24 10	2892	73 51 41	2905	72 19 28	2916
	Aldebaran	E.	102 25 29	2901	100 53 12	2915	99 21 12	2927	97 49 27	2938
9	SUN	W.	79 25 9	3379	80 47 50	3388	82 10 20	3397	83 32 40	3407
	Mars	W.	58 17 8	3281	59 41 42	3291	61 6 4	3300	62 30 16	3308
	α Aquilæ	W.	48 26 35	4166	49 35 33	4194	50 45 12	4084	51 55 29	4047
	Venus	W.	32 9 9	3387	33 31 40	3397	34 54 0	3405	36 16 11	3412
	α Arietis	E.	59 38 38	3199	58 12 28	3215	56 46 37	3231	55 21 5	3248
	Jupiter	E.	64 41 56	2909	63 11 5	2979	61 40 26	2988	60 9 58	2997
	Aldebaran	E.	90 14 8	2989	88 43 42	2999	87 13 28	3007	85 43 24	3015
10	SUN	W.	90 21 59	3442	91 43 28	3447	93 4 51	3453	94 26 8	3457
	Mars	W.	69 28 57	3343	70 52 19	3349	72 15 34	3353	73 38 44	3357
	α Aquilæ	W.	57 54 47	3911	59 7 56	3889	60 21 27	3869	61 35 18	3851
	Venus	W.	43 5 4	3446	44 26 29	3450	45 47 49	3454	47 9 4	3458
	α Arietis	E.	48 18 22	3336	46 54 52	3355	45 31 44	3376	44 9 0	3398
	Jupiter	E.	52 40 7	3033	51 10 35	3039	49 41 10	3044	48 11 52	3049
	Aldebaran	E.	78 15 22	3048	76 46 9	3054	75 17 3	3059	73 48 3	3062
11	SUN	W.	101 11 29	3471	102 32 25	3473	103 53 19	3474	105 14 12	3474
	Mars	W.	80 33 32	3372	81 56 21	3379	83 19 9	3373	84 41 56	3374
	α Aquilæ	W.	67 48 53	3775	69 4 21	3763	70 20 2	3750	71 35 56	3740
	Venus	W.	53 54 25	3471	55 15 22	3471	56 36 18	3471	57 57 14	3471
	Fomalhaut	W.	32 52 3	3921	34 5 1	3859	35 19 2	3804	36 34 0	3756
	α Arietis	E.	37 22 4	3532	36 2 15	3568	34 43 6	3607	33 24 39	3649
	Jupiter	E.	40 46 46	3069	39 17 59	3079	37 49 15	3075	36 20 35	3077
	Aldebaran	E.	66 24 4	3076	64 55 25	3078	63 26 48	3078	61 58 12	3078
12	SUN	W.	111 58 45	3468	113 19 45	3466	114 40 47	3463	116 1 53	3458
	Mars	W.	91 35 57	3367	92 58 51	3365	94 21 48	3361	95 44 49	3358
	α Aquilæ	W.	77 58 9	3691	79 15 6	3689	80 32 12	3674	81 49 27	3666
	Venus	W.	64 42 9	3463	66 3 15	3459	67 24 25	3455	68 45 39	3452

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	P. L. of Diff.	III <sup>h</sup> .	P. L. of Diff.	VI <sup>h</sup> .	P. L. of Diff.	IX <sup>h</sup> .	P. L. of Diff.
12	Fomalhaut	W.	37° 49' 48"	3711	39° 6' 23"	3672	40° 23' 40"	3635	41° 41' 36"	3602
	α Pegasi	W.	28 38 24	5508	29 29 2	5283	30 22 22	5088	31 18 9	4918
	Jupiter	E.	34 51 57	3079	33 23 22	3081	31 54 49	3083	30 26 19	3086
	Aldebaran	E.	60 29 36	3078	59 1 0	3078	57 32 23	3077	56 3 45	3074
	Pollux	E.	104 38 7	3114	103 10 15	3114	101 42 22	3112	100 14 27	3110
13	SUN	W.	117 23 4	3454	118 44 19	3450	120 5 39	3445	121 27 5	3439
	Mars	W.	97 7 53	3354	98 31 2	3349	99 54 17	3344	101 17 38	3339
	α Aquilæ	W.	83 6 50	3659	84 24 21	3650	85 42 1	3644	86 59 48	3638
	Venus	W.	70 6 57	3447	71 28 20	3441	72 49 50	3436	74 11 26	3431
	Fomalhaut	W.	48 19 29	3469	49 40 28	3446	51 1 52	3426	52 23 39	3406
	α Pegasi	W.	36 27 2	4311	37 33 44	4294	38 41 47	4145	39 51 5	4074
	Aldebaran	E.	48 39 53	3060	47 10 55	3056	45 41 52	3052	44 12 43	3047
	Pollux	E.	92 54 4	3094	91 25 47	3090	89 57 25	3085	88 28 57	3080
14	α Aquilæ	W.	93 30 20	3610	94 48 44	3604	96 7 14	3600	97 25 48	3596
	Venus	W.	81 1 14	3394	82 23 37	3386	83 46 10	3378	85 8 52	3368
	Fomalhaut	W.	59 17 58	3318	60 41 49	3301	62 5 59	3285	63 30 28	3270
	α Pegasi	W.	45 53 22	3793	47 8 31	3748	48 24 27	3707	49 41 7	3669
	Aldebaran	E.	36 45 22	3017	35 15 30	3010	33 45 30	3003	32 15 21	2996
	Pollux	E.	81 4 57	3050	79 35 46	3043	78 6 27	3036	76 36 59	3028
15	Venus	W.	92 5 6	3319	93 28 55	3309	94 52 56	3297	96 17 11	3286
	Fomalhaut	W.	70 37 12	3198	72 3 23	3184	73 29 51	3171	74 56 35	3157
	α Pegasi	W.	56 14 2	3506	57 34 20	3476	58 55 11	3449	60 16 32	3425
	Pollux	E.	69 7 14	2989	67 36 47	2980	66 6 9	2971	64 35 20	2962
	Regulus	E.	104 50 4	2950	103 18 49	2940	101 47 21	2931	100 15 41	2921
16	Fomalhaut	W.	82 14 14	3093	83 42 32	3081	85 11 5	3069	86 39 52	3057
	α Pegasi	W.	67 10 3	3312	68 34 1	3291	69 58 23	3272	71 23 7	3253
	α Arietis	W.	24 24 27	3903	25 37 44	3782	26 53 5	3677	28 10 17	3585
	Pollux	E.	56 58 28	2918	55 26 32	2909	53 54 24	2900	52 22 5	2892
	Regulus	E.	92 34 10	2869	91 1 11	2859	89 27 59	2848	87 54 33	2836
17	Fomalhaut	W.	94 7 19	3003	95 37 28	2993	97 7 50	2983	98 38 24	2973
	α Pegasi	W.	78 32 5	3167	79 58 51	3154	81 25 55	3140	82 53 16	3125
	α Arietis	W.	34 57 55	3261	36 22 52	3216	37 48 42	3174	39 15 22	3134
	Jupiter	W.	26 32 53	2803	28 7 17	2788	29 42 0	2773	31 17 3	2758
	Pollux	E.	44 37 53	2852	43 4 33	2845	41 31 4	2839	39 57 27	2834
	Regulus	E.	80 3 45	2781	78 28 52	2769	76 53 44	2758	75 18 21	2747
18	α Pegasi	W.	90 14 3	3065	91 42 55	3056	93 11 59	3046	94 41 15	3037
	α Arietis	W.	46 39 26	2979	48 10 5	2954	49 41 15	2931	51 12 55	2909
	Jupiter	W.	39 16 56	2692	40 53 46	2681	42 30 52	2668	44 8 15	2657
	Pollux	E.	32 8 1	2622	30 34 2	2625	29 0 6	2630	27 26 17	2638
	Regulus	E.	67 17 47	2692	65 40 56	2681	64 3 51	2670	62 26 31	2660
19	α Arietis	W.	58 57 56	2812	60 32 8	2796	62 6 41	2780	63 41 35	2765
	Jupiter	W.	52 18 59	2601	53 57 52	2591	55 36 59	2581	57 16 20	2571
	Aldebaran	W.	25 58 27	2612	27 37 6	2601	29 16 0	2590	30 55 9	2580
	Regulus	E.	54 16 22	2609	52 37 39	2599	50 58 43	2590	49 19 34	2580
	Spica	E.	108 6 42	2643	106 28 45	2632	104 50 33	2621	103 12 7	2612
20	α Arietis	W.	71 40 47	2699	73 17 28	2687	74 54 25	2676	76 31 37	2666
	Jupiter	W.	65 36 26	2525	67 17 5	2516	68 57 56	2507	70 38 59	2499



## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
12	Fomalhaut W.		43 0 8	3579	44 19 13	3543	45 38 50	3516	46 58 56	3489
	α Pegasi W.		32 16 9	4768	33 16 12	4633	34 18 8	4514	35 21 48	4408
	Jupiter E.		28 57 52	3087	27 29 27	3090	26 1 5	3092	24 32 46	3095
	Aldebaran E.		54 35 4	3073	53 6 21	3070	51 37 35	3068	50 8 46	3065
	Pollux E.		98 46 29	3107	97 18 28	3105	95 50 24	3101	94 22 16	3098
13	Sun W.		122 48 37	3433	124 10 16	3426	125 32 1	3422	126 53 53	3414
	Mars W.		102 41 4	3333	104 4 37	3326	105 28 18	3320	106 52 6	3313
	α Aquilæ W.		88 17 41	3632	89 35 41	3625	90 53 48	3620	92 12 1	3614
	Venus W.		75 33 8	3423	76 54 58	3417	78 16 55	3410	79 39 0	3402
	Fomalhaut W.		53 45 49	3386	55 8 21	3369	56 31 13	3351	57 54 26	3334
	α Pegasi W.		41 1 32	4009	42 13 3	3947	43 25 35	3892	44 39 3	3842
	Aldebaran E.		42 43 29	3042	41 14 8	3036	39 44 40	3030	38 15 5	3024
14	Pollux E.		87 0 23	3074	85 31 42	3069	84 2 55	3063	82 34 0	3056
	α Aquilæ W.		98 44 25	3594	100 3 6	3591	101 21 50	3580	102 40 36	3587
	Venus W.		86 31 45	3359	87 54 48	3349	89 18 3	3339	90 41 29	3330
	Fomalhaut W.		64 55 14	3255	66 20 18	3241	67 45 39	3228	69 11 17	3212
	α Pegasi W.		50 58 27	3633	52 16 26	3597	53 35 4	3565	54 54 17	3535
15	Aldebaran E.		30 45 3	2988	29 14 35	2981	27 43 58	2972	26 13 10	2963
	Pollux E.		75 7 21	3021	73 37 34	3013	72 7 37	3005	70 37 31	2997
	Venus W.		97 41 39	3275	99 6 20	3263	100 31 15	3252	101 56 23	3240
	Fomalhaut W.		76 23 36	3144	77 50 52	3131	79 18 24	3119	80 46 11	3105
	α Pegasi W.		61 38 20	3400	63 0 36	3376	64 23 20	3354	65 46 29	3332
16	Pollux E.		63 4 20	2954	61 33 9	2944	60 1 46	2935	58 30 12	2927
	Regulus E.		98 43 49	2911	97 11 44	2901	95 39 26	2891	94 6 55	2880
	Fomalhaut W.		88 8 54	3046	89 38 10	3034	91 7 40	3024	92 37 23	3014
	α Pegasi W.		72 48 13	3235	74 13 41	3218	75 39 29	3201	77 5 37	3184
	α Arietis W.		29 29 8	3504	30 49 28	3433	32 11 7	3370	33 33 58	3313
17	Pollux E.		50 49 36	2883	49 16 56	2875	47 44 5	2867	46 11 4	2859
	Regulus E.		86 20 52	2825	84 46 57	2814	83 12 47	2803	81 38 23	2792
	Fomalhaut W.		100 9 10	2965	101 40 7	2956	103 11 15	2948	104 42 33	2941
	α Pegasi W.		84 20 55	3112	85 48 50	3100	87 17 0	3088	88 45 24	3076
	α Arietis W.		40 42 50	3099	42 11 1	3066	43 39 52	3035	45 9 21	3006
18	Jupiter W.		32 52 26	2744	34 28 7	2731	36 4 6	2717	37 40 23	2705
	Pollux E.		38 23 43	2829	36 49 53	2826	35 15 59	2823	33 42 1	2821
	Regulus E.		73 42 44	2736	72 6 52	2725	70 30 45	2713	68 54 23	2703
	α Pegasi W.		96 10 42	3029	97 40 19	3021	99 10 6	3014	100 40 1	3009
	α Arietis W.		52 45 3	2887	54 17 38	2866	55 50 40	2848	57 24 6	2829
19	Jupiter W.		45 45 53	2645	47 23 47	2634	49 1 56	2623	50 40 20	2612
	Pollux E.		25 52 39	2851	24 19 17	2868	22 46 17	2891	21 13 46	2920
	Regulus E.		60 48 57	2649	59 11 9	2639	57 33 7	2629	55 54 51	2619
	α Arietis W.		65 16 49	2750	66 52 22	2737	68 28 13	2723	70 4 22	2711
	Jupiter W.		58 55 55	2561	60 35 43	2551	62 15 45	2543	63 55 59	2533
20	Aldebaran W.		32 34 31	2570	34 14 7	2561	35 53 56	2551	37 33 58	2542
	Regulus E.		47 40 12	2572	46 0 38	2562	44 20 51	2553	42 40 52	2545
	Spica E.		101 33 28	2601	99 54 35	2592	98 15 29	2583	96 36 10	2574
	α Arietis W.		78 9 2	2656	79 46 41	2647	81 24 32	2638	83 2 35	2629
	Jupiter W.		72 20 13	2492	74 1 38	2483	75 43 15	2476	77 25 2	2469

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.	Noon.	P. L. of Diff.	IIIh.	P. L. of Diff.	VIh.	P. L. of Diff.	IXh.	P. L. of Diff.
20	Aldebaran W.	39 14 13	2533	40 54 40	2525	42 35 19	2516	44 16 10	2507
	Regulus E.	41 0 42	2537	39 20 20	2529	37 39 47	2521	35 59 3	2514
	Spica E.	94 56 39	2565	93 16 56	2556	91 37 0	2548	89 56 53	2540
21	α Arietis W.	84 40 50	2621	86 19 16	2614	87 57 52	2607	89 36 38	2599
	Jupiter W.	79 6 59	2461	80 49 7	2455	82 31 24	2448	84 13 51	2441
	Aldebaran W.	52 43 15	2469	54 25 12	2462	56 7 19	2455	57 49 36	2448
	Spica E.	81 33 36	2502	79 52 26	2496	78 11 7	2489	76 29 39	2483
22	Jupiter W.	92 48 21	2411	94 31 40	2405	96 15 7	2401	97 58 41	2395
	Aldebaran W.	66 23 18	2417	68 6 28	2411	69 49 47	2405	71 33 14	2401
	Pollux W.	23 12 42	2637	24 50 47	2606	26 29 34	2578	28 8 59	2554
	Spica E.	68 0 16	2457	66 18 2	2452	64 35 41	2448	62 53 14	2443
	SUN E.	136 38 13	2757	135 2 49	2751	133 27 17	2745	131 51 37	2738
23	Aldebaran W.	80 12 18	2375	81 56 28	2371	83 40 44	2366	85 25 7	2362
	Pollux W.	36 33 6	2472	38 14 59	2460	39 57 9	2449	41 39 34	2439
	Spica E.	54 19 43	2429	52 36 49	2426	50 53 52	2425	49 10 53	2424
	Antares E.	100 13 45	2425	98 30 46	2419	96 47 39	2415	95 4 25	2410
	SUN E.	123 51 16	2710	122 14 49	2705	120 38 16	2700	119 1 36	2695
24	Aldebaran W.	94 8 30	2343	95 53 27	2339	97 38 30	2335	99 23 38	2332
	Pollux W.	50 14 48	2401	51 58 22	2394	53 42 6	2387	55 25 59	2382
	Regulus W.	14 6 58	2384	15 50 55	2374	17 35 7	2364	19 19 33	2356
	Spica E.	40 35 50	2427	38 52 54	2431	37 10 3	2436	35 27 19	2441
	Antares E.	86 26 47	2391	84 42 59	2387	82 59 6	2384	81 15 9	2381
	SUN E.	110 56 42	2673	109 19 26	2669	107 42 4	2665	106 4 37	2661
25	Pollux W.	64 7 13	2358	65 51 48	2355	67 36 28	2350	69 21 14	2346
	Regulus W.	28 4 16	2328	29 49 35	2324	31 35 0	2320	33 20 31	2316
	Antares E.	72 34 23	2370	70 50 5	2368	69 5 44	2366	67 21 21	2366
	SUN E.	97 56 7	2644	96 18 12	2640	94 40 12	2638	93 2 8	2635
26	Pollux W.	78 6 18	2332	79 51 31	2329	81 36 48	2327	83 22 8	2326
	Regulus W.	42 9 18	2302	43 55 15	2299	45 41 16	2297	47 27 20	2295
	Antares E.	58 39 10	2364	56 54 44	2364	55 10 18	2366	53 25 54	2368
	SUN E.	84 50 51	2621	83 12 25	2620	81 33 57	2618	79 55 26	2615
27	Pollux W.	92 9 25	2318	93 54 58	2317	95 40 33	2317	97 26 8	2317
	Regulus W.	56 18 22	2287	58 4 41	2285	59 51 2	2285	61 37 24	2285
	Antares E.	44 44 52	2386	43 0 57	2392	41 17 11	2400	39 33 36	2408
	SUN E.	71 42 13	2608	70 3 29	2607	68 24 44	2606	66 45 57	2606
28	Regulus W.	70 29 21	2283	72 15 45	2285	74 2 7	2285	75 48 28	2286
	Spica W.	17 56 41	2642	19 34 39	2638	21 13 50	2644	22 54 2	2650
	Antares E.	30 59 36	2482	29 17 58	2506	27 36 53	2535	25 56 29	2572
	SUN E.	58 31 59	2606	56 53 12	2607	55 14 26	2608	53 35 42	2609
29	Regulus W.	84 39 43	2296	86 25 49	2298	88 11 51	2301	89 57 49	2304
	Spica W.	31 24 23	2417	33 7 33	2410	34 50 54	2403	36 34 25	2398
	SUN E.	45 22 33	2620	43 44 5	2623	42 5 41	2626	40 27 22	2630
30	Regulus W.	98 46 15	2226	100 31 37	2231	102 16 51	2237	104 1 57	2243
	Spica W.	45 13 11	2391	46 56 59	2392	48 40 45	2394	50 24 28	2397
	SUN E.	32 17 13	2655	30 39 32	2661	29 2 0	2667	27 24 36	2675

## GREENWICH MEAN TIME.

## LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	P. L. of Diff.	XVh.	P. L. of Diff.	XVIIIh.	P. L. of Diff.	XXIh.	P. L. of Diff.
20	Aldebaran	W.	45° 57' 13"	2499	47° 38' 27"	2491	49° 19' 53"	2484	51° 1' 29"	2477
	Regulus	E.	34 18 9	2507	32 37 5	2499	30 55 51	2493	29 14 28	2487
	Spica	E.	88 16 35	2532	86 36 6	2524	84 55 26	2517	83 14 36	2510
21	α Arietis	W.	91 15 34	2583	92 54 38	2588	94 33 50	2583	96 13 9	2577
	Jupiter	W.	85 56 27	2435	87 39 12	2428	89 22 7	2422	91 5 10	2417
	Aldebaran	W.	59 32 2	2442	61 14 37	2435	62 57 22	2429	64 40 16	2423
	Spica	E.	74 48 2	2477	73 6 17	2472	71 24 24	2466	69 42 23	2462
22	Jupiter	W.	99 42 23	2390	101 26 12	2386	103 10 7	2381	104 54 9	2375
	Aldebaran	W.	73 16 48	2395	75 0 30	2390	76 44 19	2385	78 28 15	2380
	Pollux	W.	29 48 57	2533	31 29 24	2515	33 10 16	2499	34 51 31	2485
	Spica	E.	61 10 41	2440	59 28 3	2437	57 45 21	2433	56 2 34	2431
	SUN	E.	130 15 48	2732	128 39 51	2727	127 3 47	2721	125 27 35	2716
23	Aldebaran	W.	87 9 36	2358	88 54 11	2354	90 38 52	2350	92 23 38	2346
	Pollux	W.	43 22 13	2430	45 5 5	2422	46 48 8	2414	48 31 23	2407
	Spica	E.	47 27 52	2423	45 44 50	2424	44 1 49	2424	42 18 49	2425
	Antares	E.	93 21 5	2406	91 37 39	2402	89 54 7	2398	88 10 30	2394
	SUN	E.	117 24 49	2690	115 47 56	2686	114 10 57	2681	112 33 52	2676
24	Aldebaran	W.	101 8 51	2398	102 54 9	2396	104 39 31	2392	106 24 58	2390
	Pollux	W.	57 9 59	2377	58 54 7	2372	60 38 22	2367	62 22 44	2362
	Regulus	W.	21 4 11	2349	22 48 59	2342	24 33 57	2337	26 19 3	2332
	Spica	E.	33 44 43	2448	32 2 17	2458	30 20 5	2469	28 38 8	2482
	Antares	E.	79 31 7	2378	77 47 1	2376	76 2 52	2373	74 18 39	2371
	SUN	E.	104 27 5	2657	102 49 27	2654	101 11 45	2650	99 33 58	2647
25	Pollux	W.	71 6 6	2344	72 51 2	2340	74 36 3	2337	76 21 8	2334
	Regulus	W.	35 6 7	2313	36 51 48	2309	38 37 34	2307	40 23 24	2304
	Antares	E.	65 36 57	2365	63 52 32	2364	62 8 5	2363	60 23 37	2364
	SUN	E.	91 24 0	2632	89 45 48	2629	88 7 32	2626	86 29 13	2624
26	Pollux	W.	85 7 30	2394	86 52 55	2392	88 38 23	2390	90 23 53	2319
	Regulus	W.	49 13 27	2293	50 59 37	2291	52 45 50	2289	54 32 5	2288
	Antares	E.	51 41 33	2370	49 57 15	2373	48 13 2	2377	46 28 54	2381
	SUN	E.	78 16 52	2613	76 38 15	2612	74 59 36	2610	73 20 55	2610
27	Pollux	W.	99 11 43	2317	100 57 18	2317	102 42 53	2317	104 28 27	2318
	Regulus	W.	63 23 46	2284	65 10 9	2283	66 56 33	2283	68 42 57	2283
	Antares	E.	37 50 13	2419	36 7 5	2431	34 24 14	2445	32 41 43	2462
	SUN	E.	65 7 10	2605	63 28 22	2605	61 49 34	2605	60 10 46	2606
28	Regulus	W.	77 34 48	2287	79 21 6	2289	81 7 21	2291	82 53 33	2293
	Spica	W.	24 35 4	2481	26 16 44	2460	27 58 54	2442	29 41 29	2429
	Antares	E.	24 16 55	2615	22 38 21	2670	21 1 1	2740	19 25 14	2825
	SUN	E.	51 56 59	2610	50 18 18	2612	48 39 40	2615	47 1 5	2617
29	Regulus	W.	91 43 42	2308	93 29 30	2313	95 15 11	2317	97 0 46	2321
	Spica	W.	38 18 3	2394	40 1 46	2391	41 45 33	2390	43 29 22	2390
	SUN	E.	38 49 8	2635	37 11 0	2638	35 32 57	2643	33 55 1	2649
30	Regulus	W.	105 46 54	2349	107 31 42	2355	109 16 21	2362	111 0 50	2369
	Spica	W.	52 8 7	2401	53 51 41	2405	55 35 9	2410	57 18 30	2415
	SUN	E.	25 47 22	2692	24 10 18	2690	22 33 25	2699	20 56 44	2710

## GREENWICH MEAN TIME.

JANUARY.						FEBRUARY.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"		h m s	h m s	s	° ' "	"	h m
1	16 34 47.63	13.015	20 36 26.7	33.42	21 51.3	1	19 20 36.45	13.373	22 8 37.9	18.83	22 35.0
2	16 40 0.53	13.058	20 49 7.5	31.00	21 52.5	2	19 25 57.13	13.349	22 0 45.8	20.50	22 36.4
3	16 45 14.41	13.098	21 1 13.4	29.50	21 53.8	3	19 31 17.21	13.323	21 52 13.9	22.15	22 37.8
4	16 50 29.24	13.137	21 12 43.8	28.00	21 55.1	4	19 36 36.66	13.296	21 43 2.4	23.79	22 39.1
5	16 55 44.90	13.175	21 23 38.0	26.50	21 56.4	5	19 41 55.41	13.268	21 33 11.6	25.43	22 40.4
6	17 1 1.63	13.210	21 33 55.5	24.95	21 57.8	6	19 47 13.43	13.234	21 22 42.0	27.03	22 41.7
7	17 6 19.10	13.244	21 43 35.9	23.40	21 59.2	7	19 52 30.66	13.201	21 11 34.1	28.62	22 43.2
8	17 11 37.35	13.277	21 52 38.7	21.82	22 0.6	8	19 57 47.06	13.166	20 59 48.2	30.20	22 44.5
9	17 16 56.36	13.307	22 1 3.3	20.22	22 2.0	9	20 3 2.61	13.129	20 47 24.7	31.75	22 45.8
10	17 22 16.09	13.335	22 8 49.3	18.60	22 3.4	10	20 8 17.26	13.091	20 34 24.1	33.26	22 47.1
11	17 27 36.47	13.361	22 15 56.2	17.00	22 4.8	11	20 13 30.97	13.051	20 20 47.1	34.79	22 48.4
12	17 32 57.43	13.385	22 22 23.7	15.32	22 6.2	12	20 18 43.72	13.010	20 6 34.0	36.26	22 49.7
13	17 38 18.93	13.406	22 28 11.5	13.66	22 7.6	13	20 23 55.48	12.968	19 51 45.4	37.75	22 50.9
14	17 43 40.92	13.426	22 33 19.4	12.00	22 9.0	14	20 29 6.21	12.923	19 36 22.0	39.19	22 52.1
15	17 49 3.36	13.442	22 37 47.2	10.32	22 10.4	15	20 34 15.88	12.881	19 20 24.3	40.60	22 53.3
16	17 54 26.16	13.457	22 41 34.6	8.62	22 11.8	16	20 39 24.48	12.836	19 3 52.9	42.00	22 54.5
17	17 59 49.28	13.469	22 44 41.1	6.91	22 13.2	17	20 44 31.99	12.790	18 46 48.3	43.37	22 55.7
18	18 5 12.66	13.479	22 47 6.6	5.20	22 14.7	18	20 49 38.42	12.744	18 29 11.2	44.71	22 56.8
19	18 10 36.26	13.487	22 48 50.7	3.47	22 16.2	19	20 54 43.73	12.698	18 11 2.2	46.03	22 57.9
20	18 16 0.02	13.492	22 49 53.4	1.75	22 17.7	20	20 59 47.91	12.650	17 52 22.0	47.31	22 59.0
21	18 21 23.86	13.494	22 50 14.5	-0.01	22 19.2	21	21 4 50.95	12.603	17 33 11.3	48.57	23 0.1
22	18 26 47.73	13.494	22 49 54.0	+1.71	22 20.6	22	21 9 52.87	12.556	17 13 30.6	49.80	23 1.2
23	18 32 11.59	13.493	22 48 52.2	3.44	22 22.1	23	21 14 53.65	12.509	16 53 20.6	51.01	23 2.3
24	18 37 35.38	13.489	22 47 9.0	5.16	22 23.6	24	21 19 53.29	12.461	16 32 42.2	52.18	23 3.3
25	18 42 59.05	13.482	22 44 44.3	6.88	22 25.1	25	21 24 51.79	12.414	16 11 36.0	53.33	23 4.3
26	18 48 22.53	13.473	22 41 38.3	8.60	22 26.5	26	21 29 49.18	12.368	15 50 2.5	54.45	23 5.3
27	18 53 45.75	13.461	22 37 50.9	10.33	22 27.9	27	21 34 45.46	12.322	15 28 2.5	55.53	23 6.3
28	18 59 8.67	13.448	22 33 22.2	12.05	22 29.3	28	21 39 40.62	12.275	15 5 36.8	56.59	23 7.2
29	19 4 31.26	13.433	22 28 12.3	13.77	22 30.7	29	21 44 34.68	12.230	14 42 46.1	57.62	23 8.1
30	19 9 53.46	13.416	22 22 21.4	15.47	22 32.2	30	21 49 27.66	12.185	14 19 30.9	58.62	23 9.0
31	19 15 15.21	13.396	22 15 49.8	17.16	22 33.6	31	21 54 19.57	12.141	13 55 52.1	59.60	23 10.0
32	19 20 36.45	13.373	22 8 37.9	18.83	22 35.0	32	21 59 10.42	12.097	13 31 50.3	60.52	23 10.9
Day of Month, 1st.						Day of the Month, 5th.					
Semidiam. 6.3						Semidiameter 5.6					
Hor. Par. 6.3						Horizontal Parallax 5.6					
6th.	6.2	6.1	6.0	5.9	5.8	10th.	5.6	5.5	5.4	5.3	
11th.	6.2	6.1	6.0	5.9	5.8	15th.	5.6	5.5	5.4	5.3	
16th.	6.2	6.1	6.0	5.9	5.8	20th.	5.6	5.5	5.4	5.3	
21st.	6.2	6.1	6.0	5.9	5.8	25th.	5.6	5.5	5.4	5.3	
26th.	6.2	6.1	6.0	5.9	5.8						
31st.	6.2	6.1	6.0	5.9	5.8						

GREENWICH MEAN TIME.

MARCH.						APRIL.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
Noon.	Noon.	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.	Noon.	Noon.	
h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m	
1	21 44 34.68	19.930	14 42 46.1	57.68	23 8.1	1	0 9 26.93	11.348	0 33 46.3	74.44	23 30.5
2	21 49 27.66	19.185	14 19 30.9	58.68	23 9.0	2	0 13 59.25	11.345	0 3 58.9	74.50	23 31.1
3	21 54 19.57	19.141	13 55 52.1	59.60	23 10.0	3	0 18 31.51	11.343	+0 25 49.7	74.53	23 31.7
4	21 59 10.42	19.097	13 31 50.3	60.52	23 10.9	4	0 23 3.74	11.343	0 55 38.7	74.54	23 32.3
5	22 4 0.22	19.054	13 7 26.4	61.44	23 11.8	5	0 27 35.98	11.344	1 25 27.6	74.56	23 32.9
6	22 8 49.01	19.012	12 42 41.0	62.39	23 12.7	6	0 32 8.27	11.347	1 55 15.5	74.46	23 33.5
7	22 13 36.80	11.971	12 17 35.0	63.17	23 13.5	7	0 36 40.64	11.351	2 25 1.6	74.37	23 34.1
8	22 18 23.62	11.931	11 52 9.0	63.98	23 14.3	8	0 41 13.14	11.358	2 54 45.1	74.25	23 34.7
9	22 23 9.48	11.891	11 26 23.7	64.77	23 15.1	9	0 45 45.81	11.366	3 24 25.6	74.11	23 35.3
10	22 27 54.41	11.853	11 0 20.0	65.53	23 15.9	10	0 50 18.69	11.375	3 54 2.4	73.04	23 35.9
11	22 32 38.43	11.815	10 33 58.5	66.25	23 16.7	11	0 54 51.81	11.386	4 23 34.6	73.73	23 36.5
12	22 37 21.55	11.778	10 7 20.0	66.94	23 17.4	12	0 59 25.22	11.399	4 53 1.6	73.49	23 37.2
13	22 42 3.80	11.743	9 40 25.3	67.60	23 18.1	13	1 3 58.96	11.413	5 22 22.6	73.23	23 37.8
14	22 46 45.24	11.709	9 13 14.9	68.24	23 18.8	14	1 8 33.05	11.428	5 51 36.7	72.93	23 38.4
15	22 51 25.87	11.677	8 45 49.6	68.84	23 19.6	15	1 13 7.53	11.447	6 20 43.3	72.61	23 39.0
16	22 56 5.72	11.645	8 18 10.3	69.41	23 20.3	16	1 17 42.46	11.465	6 49 41.8	72.25	23 39.7
17	23 0 44.83	11.614	7 50 17.7	69.95	23 21.0	17	1 22 17.87	11.486	7 18 31.3	71.86	23 40.4
18	23 5 23.22	11.585	7 22 12.6	70.46	23 21.7	18	1 26 53.78	11.507	7 47 11.1	71.44	23 41.1
19	23 10 0.93	11.558	6 53 55.8	70.93	23 22.4	19	1 31 30.23	11.531	8 15 40.5	70.99	23 41.8
20	23 14 38.01	11.532	6 25 27.8	71.38	23 23.1	20	1 36 7.27	11.556	8 43 58.8	70.59	23 42.4
21	23 19 14.48	11.506	5 56 49.5	71.80	23 23.7	21	1 40 44.94	11.584	9 12 5.3	70.01	23 43.1
22	23 23 50.38	11.484	5 28 1.4	72.19	23 24.3	22	1 45 23.28	11.612	9 39 59.2	69.47	23 43.8
23	23 28 25.74	11.463	4 59 4.3	72.55	23 25.0	23	1 50 2.30	11.641	10 7 39.9	68.90	23 44.5
24	23 33 0.62	11.444	4 29 59.0	72.88	23 25.6	24	1 54 42.06	11.672	10 35 6.5	68.30	23 45.2
25	23 37 35.05	11.426	4 0 46.3	73.17	23 26.2	25	1 59 22.58	11.705	11 2 18.3	67.67	23 46.0
26	23 42 9.07	11.409	3 31 26.8	73.44	23 26.8	26	2 4 3.90	11.739	11 29 14.7	67.01	23 46.8
27	23 46 42.72	11.395	2 2 1.1	73.68	23 27.4	27	2 8 46.05	11.774	11 55 55.0	66.33	23 47.6
28	23 51 16.05	11.382	2 32 30.1	73.88	23 28.0	28	2 13 29.06	11.811	12 22 18.4	65.61	23 48.3
29	23 55 49.09	11.372	2 2 54.5	74.07	23 28.6	29	2 18 12.97	11.849	12 48 24.1	64.85	23 49.1
30	0 0 21.90	11.362	1 33 14.9	74.22	23 29.2	30	2 22 57.80	11.887	13 14 11.3	64.07	23 49.9
31	0 4 54.49	11.354	1 3 31.9	74.34	23 29.9	31	2 27 43.58	11.928	13 39 39.5	63.26	23 50.8
32	0 9 26.93	11.340	-0 33 46.3	74.44	23 30.5	32	2 32 30.34	11.969	14 4 47.8	62.42	23 51.6
Day of the Month, 2d. 7th. 12th. 17th. 22d. 27th.						Day of the Month, 1st. 6th. 11th. 16th. 21st. 26th.					
Semidiameter	5.3	5.2	5.2	5.1	5.1	Semidiameter	5.0	5.0	5.0	5.0	4.9
Hor. Parallax	5.3	5.3	5.2	5.2	5.1	Hor. Parallax	5.1	5.0	5.0	5.0	5.0

## GREENWICH MEAN TIME.

MAY.						JUNE.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
Noon.	Noon.	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.	Noon.		
h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m	
1	2 27 43.58	11.928	+13 39 39.5	63.26	23 50.8	1	5 4 10.12	13.253	+23 5 33.9	23.59	0 24.1
2	2 32 30.34	11.969	14 4 47.8	62.42	23 51.6	2	5 9 28.52	13.280	23 14 40.2	21.92	0 25.5
3	2 37 18.10	12.011	14 29 35.5	61.54	23 52.5	3	5 14 47.59	13.308	23 23 6.1	20.21	0 26.9
4	2 42 6.88	12.054	14 54 1.9	60.64	23 53.4	4	5 20 7.31	13.333	23 30 51.4	18.53	0 28.3
5	2 46 56.70	12.098	15 18 6.3	59.70	23 54.3	5	5 25 27.60	13.357	23 37 55.6	16.81	0 29.7
6	2 51 47.58	12.144	15 41 47.7	58.74	23 55.2	6	5 30 48.44	13.378	23 44 18.4	15.08	0 31.1
7	2 56 39.55	12.188	16 5 5.7	57.74	23 56.1	7	5 36 9.75	13.395	23 49 59.6	13.33	0 32.5
8	3 1 32.60	12.233	16 27 59.4	56.72	23 57.1	8	5 41 31.47	13.412	23 54 58.7	11.58	0 33.9
9	3 6 26.75	12.279	16 50 28.2	55.66	23 58.1	9	5 46 53.55	13.426	23 59 15.7	9.80	0 35.3
10	3 11 22.00	12.325	17 12 31.0	54.57	23 59.1	10	5 52 15.92	13.437	24 2 50.3	8.05	0 36.7
11	3 16 18.38	12.372	17 34 7.3	53.44		11	5 57 38.53	13.446	24 5 42.3	6.27	0 38.2
12	3 21 15.87	12.419	17 55 16.4	52.30	0 0.1	12	6 3 1.32	13.452	24 7 51.5	4.49	0 39.6
13	3 26 14.49	12.466	18 15 57.6	51.12	0 1.1	13	6 8 24.22	13.456	24 9 17.9	2.70	0 41.0
14	3 31 14.24	12.513	18 36 10.0	49.91	0 2.2	14	6 13 47.19	13.457	24 10 1.4	+0.92	0 42.5
15	3 36 15.11	12.560	18 55 53.3	48.67	0 3.3	15	6 19 10.15	13.455	24 10 1.9	-0.87	0 44.0
16	3 41 17.10	12.606	19 15 6.4	47.40	0 4.4	16	6 24 33.03	13.450	24 9 19.3	2.58	0 45.4
17	3 46 20.20	12.652	19 33 48.6	46.10	0 5.5	17	6 29 55.77	13.443	24 7 53.7	4.46	0 46.9
18	3 51 24.40	12.698	19 51 59.3	44.77	0 6.6	18	6 35 18.31	13.434	24 5 45.0	6.25	0 48.3
19	3 56 29.70	12.744	20 9 37.9	43.43	0 7.7	19	6 40 40.60	13.422	24 2 53.6	8.03	0 49.7
20	4 1 36.10	12.788	20 26 43.6	42.04	0 8.9	20	6 46 2.59	13.408	23 59 19.3	9.82	0 51.2
21	4 6 43.55	12.833	20 43 16.0	40.64	0 10.1	21	6 51 24.20	13.392	23 55 2.4	11.55	0 52.6
22	4 11 52.07	12.877	20 59 14.2	39.20	0 11.3	22	6 56 45.39	13.372	23 50 3.0	13.36	0 54.0
23	4 17 1.63	12.919	21 14 37.7	37.74	0 12.5	23	7 2 6.09	13.351	23 44 21.3	15.12	0 55.4
24	4 22 12.20	12.961	21 29 25.8	36.26	0 13.7	24	7 7 26.25	13.328	23 37 57.5	16.86	0 56.8
25	4 27 23.76	13.002	21 43 38.1	34.75	0 15.0	25	7 12 45.82	13.302	23 30 52.0	18.60	0 58.1
26	4 32 36.29	13.042	21 57 14.0	33.23	0 16.3	26	7 18 4.74	13.272	23 23 4.9	20.32	0 59.5
27	4 37 49.76	13.080	22 10 12.8	31.67	0 17.6	27	7 23 22.96	13.244	23 14 36.6	22.03	1 0.9
28	4 43 4.14	13.117	22 22 34.1	30.09	0 18.9	28	7 28 40.45	13.212	23 5 27.5	23.72	1 2.3
29	4 48 19.41	13.154	22 34 17.3	28.50	0 20.2	29	7 33 57.15	13.179	22 55 37.8	25.40	1 3.7
30	4 53 35.53	13.188	22 45 22.0	26.88	0 21.5	30	7 39 13.04	13.144	22 45 8.1	27.07	1 5.0
31	4 58 52.44	13.220	22 55 47.7	25.24	0 22.8	31	7 44 28.05	13.107	22 33 58.6	28.72	1 6.2
32	5 4 10.12	13.253	+23 5 33.9	23.59	0 24.1	32	7 49 42.16	13.069	+22 22 9.8	30.34	1 7.5
Day of Month, 1st.						Day of the Month, 5th.					
Semidiam. 4.9						Semidiameter 5.0					
Hor. Par. 5.0						Hor. Par. 5.0					
6th.	11th.	16th.	21st.	26th.	31st.	10th.	15th.	20th.	25th.	30th.	
4.9	4.9	4.9	4.9	4.9	4.9	5.0	5.0	5.0	5.0	5.1	5.1
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.1	5.2

## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
h m s	h m s	h m s	h m s	h m s	h m s	h m s	h m s	h m s	h m s	h m s	h m s
1	7 44 28.05	13.107	+22 33 58.6	28.72	1 6.2	1	10 17 51.73	11.613	+12 11 49.7	67.17	1 37.3
2	7 49 42.16	13.069	22 22 9.8	30.34	1 7.5	2	10 22 29.92	11.570	11 44 48.0	67.95	1 38.1
3	7 54 55.31	13.028	22 9 42.4	31.94	1 8.8	3	10 27 7.10	11.529	11 17 28.1	68.70	1 38.8
4	8 0 7.51	12.987	21 56 36.6	33.53	1 10.1	4	10 31 43.31	11.489	10 49 50.6	69.42	1 39.4
5	8 5 18.69	12.943	21 42 53.0	35.09	1 11.3	5	10 36 18.57	11.450	10 21 56.1	70.11	1 40.0
6	8 10 28.80	12.898	21 28 32.1	36.63	1 12.5	6	10 40 52.91	11.413	9 53 45.4	70.74	1 40.7
7	8 15 37.82	12.852	21 13 34.6	38.15	1 13.7	7	10 45 26.39	11.377	9 25 19.3	71.40	1 41.3
8	8 20 45.72	12.805	20 58 0.8	39.65	1 14.9	8	10 49 50.01	11.342	8 56 38.8	71.98	1 41.9
9	8 25 52.47	12.757	20 41 51.5	41.12	1 16.1	9	10 54 30.81	11.308	8 27 44.4	72.50	1 42.5
10	8 30 58.06	12.708	20 25 7.2	42.56	1 17.2	10	10 59 1.82	11.276	7 58 37.0	73.07	1 43.1
11	8 36 2.47	12.659	20 7 48.5	43.98	1 18.3	11	11 3 32.07	11.245	7 29 17.0	73.58	1 43.6
12	8 41 5.69	12.609	19 49 56.0	45.38	1 19.4	12	11 8 1.59	11.216	6 59 45.1	74.06	1 44.1
13	8 46 7.69	12.558	19 31 30.3	46.74	1 20.6	13	11 12 30.43	11.188	6 30 2.2	74.50	1 44.6
14	8 51 8.46	12.506	19 12 32.3	48.08	1 21.6	14	11 16 58.63	11.162	6 0 9.1	74.91	1 45.2
15	8 56 7.98	12.454	18 53 2.6	49.38	1 22.6	15	11 21 26.21	11.137	5 30 6.3	75.30	1 45.7
16	9 1 6.25	12.402	18 33 1.8	50.66	1 23.6	16	11 25 53.19	11.113	4 59 54.7	75.65	1 46.2
17	9 6 3.26	12.349	18 12 30.6	51.92	1 24.7	17	11 30 19.64	11.091	4 29 34.9	75.98	1 46.7
18	9 10 59.01	12.297	17 51 29.6	53.15	1 25.7	18	11 34 45.58	11.071	3 59 7.6	76.28	1 47.2
19	9 15 53.51	12.245	17 29 59.5	54.34	1 26.6	19	11 39 11.07	11.053	3 28 33.5	76.55	1 47.7
20	9 20 46.75	12.192	17 8 1.0	55.51	1 27.5	20	11 43 36.14	11.037	2 57 53.4	76.78	1 48.2
21	9 25 38.73	12.139	16 45 34.9	56.64	1 28.5	21	11 48 0.83	11.022	2 27 8.1	76.98	1 48.7
22	9 30 29.46	12.088	16 22 42.0	57.75	1 29.4	22	11 52 25.17	11.008	1 56 18.4	77.16	1 49.1
23	9 35 18.95	12.037	15 59 22.9	58.83	1 30.3	23	11 56 49.23	10.997	1 25 24.5	77.31	1 49.6
24	9 40 7.23	11.986	15 35 38.3	59.88	1 31.2	24	12 1 13.04	10.988	0 54 27.3	77.43	1 50.1
25	9 44 54.30	11.937	15 11 28.9	60.89	1 32.0	25	12 5 36.63	10.980	+0 23 27.6	77.53	1 50.6
26	9 49 40.19	11.887	14 46 55.4	61.88	1 32.8	26	12 10 0.07	10.974	-0 7 33.9	77.59	1 50.9
27	9 54 24.90	11.839	14 21 58.6	62.84	1 33.6	27	12 14 23.40	10.970	0 38 36.7	77.63	1 51.4
28	9 59 8.47	11.792	13 56 39.2	63.77	1 34.4	28	12 18 46.64	10.968	1 9 40.0	77.63	1 51.9
29	10 3 50.90	11.745	13 30 57.8	64.66	1 35.2	29	12 23 9.85	10.967	1 40 43.2	77.62	1 52.3
30	10 8 32.24	11.700	13 4 55.3	65.53	1 35.9	30	12 27 33.08	10.969	2 11 45.5	77.57	1 52.7
31	10 13 12.50	11.656	12 38 32.4	66.37	1 36.6	31	12 31 56.37	10.972	2 42 46.4	77.49	1 53.2
32	10 17 51.73	11.613	+12 11 49.7	67.17	1 37.3	32	12 36 19.74	10.977	-3 13 45.1	77.39	1 53.6
Day of the Month, 5th. 10th. 15th. 20th. 25th. 30th.						Day of the Month, 4th. 9th. 14th. 19th. 24th. 29th.					
Semidiameter	5.2	5.2	5.3	5.3	5.4	Semidiameter	5.6	5.7	5.8	5.9	6.0
Hor. Parallax	5.2	5.3	5.3	5.4	5.5	Hor. Parallax	5.6	5.7	5.8	5.9	6.0

GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	<small>h m s</small>	<small>s</small>	<small>° ' "</small>	<small>"</small>	<small>h m</small>		<small>h m s</small>	<small>s</small>	<small>° ' "</small>	<small>"</small>	<small>h m</small>
1	12 36 19.74	10.977	−3 13 45.1	77.39	1 53.6	1	14 51 49.50	11.804	−17 26 42.6	60.94	2 10.9
2	12 40 43.26	10.984	3 44 41.0	77.26	1 54.0	2	14 56 33.34	11.849	17 50 35.7	59.18	2 11.7
3	12 45 6.96	10.992	4 15 33.5	77.09	1 54.5	3	15 1 18.26	11.893	18 14 3.5	58.11	2 12.5
4	12 49 30.88	11.002	4 46 21.5	76.89	1 55.0	4	15 6 4.24	11.938	18 37 5.1	57.00	2 13.3
5	12 53 55.06	11.014	5 17 4.2	76.66	1 55.4	5	15 10 51.30	11.984	18 59 39.7	55.87	2 14.1
6	12 58 19.54	11.027	5 47 41.1	76.41	1 55.9	6	15 15 39.46	12.029	19 21 46.9	54.71	2 15.0
7	13 2 44.35	11.041	6 18 11.6	76.12	1 56.4	7	15 20 28.70	12.074	19 43 25.9	53.52	2 15.9
8	13 7 9.54	11.058	6 48 35.0	75.81	1 56.9	8	15 25 19.00	12.118	20 4 35.8	52.29	2 16.8
9	13 11 35.14	11.076	7 18 50.7	75.47	1 57.4	9	15 30 10.37	12.162	20 25 15.7	51.03	2 17.9
10	13 16 1.19	11.095	7 48 57.7	75.10	1 57.9	10	15 35 2.80	12.206	20 45 25.4	49.76	2 18.7
11	13 20 27.72	11.116	8 18 55.3	74.69	1 58.3	11	15 39 56.27	12.249	21 5 4.0	48.44	2 19.6
12	13 24 54.75	11.138	8 48 42.8	74.26	1 58.8	12	15 44 50.79	12.293	21 24 10.6	47.10	2 20.5
13	13 29 22.34	11.162	9 18 19.6	73.79	1 59.3	13	15 49 46.33	12.334	21 42 44.7	45.73	2 21.5
14	13 33 50.52	11.187	9 47 44.9	73.30	1 59.8	14	15 54 42.85	12.375	22 0 45.7	44.34	2 22.5
15	13 38 19.31	11.213	10 16 58.0	72.77	2 0.4	15	15 59 40.33	12.415	22 18 12.9	42.91	2 23.5
16	13 42 48.75	11.241	10 45 57.9	72.21	2 1.0	16	16 4 38.76	12.453	22 35 5.4	41.45	2 24.5
17	13 47 18.89	11.270	11 14 44.1	71.63	2 1.6	17	16 9 38.09	12.490	22 51 22.8	39.98	2 25.6
18	13 51 49.73	11.301	11 43 15.9	71.00	2 2.2	18	16 14 38.31	12.527	23 7 4.7	38.49	2 26.7
19	13 56 21.32	11.333	12 11 32.5	70.36	2 2.7	19	16 19 39.38	12.561	23 22 10.3	36.97	2 27.8
20	14 0 53.69	11.365	12 39 33.3	69.68	2 3.3	20	16 24 41.26	12.594	23 36 39.0	35.42	2 28.9
21	14 5 26.87	11.400	13 7 17.3	68.97	2 3.9	21	16 29 43.91	12.626	23 50 30.3	33.84	2 30.0
22	14 10 0.90	11.436	13 34 44.0	68.23	2 4.5	22	16 34 47.30	12.656	24 3 43.6	32.25	2 31.1
23	14 14 35.80	11.473	14 1 52.5	67.46	2 5.2	23	16 39 51.39	12.684	24 16 18.5	30.64	2 32.2
24	14 19 11.61	11.511	14 28 42.2	66.66	2 5.9	24	16 44 56.15	12.711	24 28 14.6	29.02	2 33.3
25	14 23 48.34	11.550	14 55 12.4	65.84	2 6.6	25	16 50 1.52	12.735	24 39 31.3	27.37	2 34.5
26	14 28 26.03	11.591	15 21 22.4	64.98	2 7.3	26	16 55 7.45	12.757	24 50 8.4	25.71	2 35.7
27	14 33 4.69	11.632	15 47 11.3	64.09	2 7.9	27	17 0 13.87	12.777	25 0 5.4	24.03	2 36.9
28	14 37 44.35	11.673	16 12 38.6	63.17	2 8.5	28	17 5 20.75	12.794	25 9 21.8	22.33	2 38.1
29	14 42 25.02	11.716	16 37 43.4	62.22	2 9.2	29	17 10 28.01	12.809	25 17 57.4	20.63	2 39.2
30	14 47 6.74	11.760	17 2 25.0	61.23	2 10.0	30	17 15 35.62	12.822	25 25 51.8	18.90	2 40.4
31	14 51 49.50	11.804	17 26 42.6	60.24	2 10.9	31	17 20 43.50	12.833	25 33 4.8	17.18	2 41.6
32	14 56 33.34	11.849	−17 50 35.7	59.18	2 11.7	32	17 25 51.58	12.840	−25 39 36.3	15.44	2 42.8
Day of the Month, 3d. 5th. 13th. 18th. 23d. 28th.						Day of the Month, 3d. 5th. 13th. 18th. 23d. 28th.					
Semidiameter 6.2 6.4 6.5 6.6 6.8 7.0						Semidiameter 7.2 7.4 7.6 7.9 8.1 8.4					
Hor. Parallax 6.3 6.4 6.6 6.7 6.9 7.1						Hor. Parallax 7.3 7.5 7.7 7.9 8.2 8.5					



## GREENWICH MEAN TIME.

### NOVEMBER.

Day of Month.	Apparent Right Ascension.			Var. of R. A. for 1 Hour.	Apparent Declination.			Var. of Dec. for 1 Hour.	Meridian Passage.	
	Noon.				Noon.					
	h	m	s	s	°	'	"	"	h	m
1	17	25	51.58	12.840	25	39	36.3	15.44	2	42.8
2	17	30	59.79	12.844	25	45	25.9	13.68	2	44.0
3	17	36	8.07	12.845	25	50	33.2	11.92	2	45.2
4	17	41	16.35	12.842	25	54	57.9	10.15	2	46.4
5	17	46	24.52	12.837	25	58	40.5	8.38	2	47.6
6	17	51	32.51	12.828	26	1	40.5	6.61	2	48.7
7	17	56	40.26	12.816	26	3	57.9	4.84	2	49.9
8	18	1	47.67	12.800	26	5	32.8	3.06	2	51.1
9	18	6	54.67	12.781	26	6	24.9	-1.29	2	52.3
10	18	12	1.17	12.758	26	6	34.5	+0.49	2	53.5
11	18	17	7.08	12.732	26	6	1.5	2.25	2	54.6
12	18	22	12.32	12.702	26	4	46.2	4.01	2	55.7
13	18	27	16.80	12.669	26	2	48.6	5.77	2	56.8
14	18	32	20.43	12.632	26	0	9.0	7.53	2	58.0
15	18	37	23.14	12.582	25	56	47.4	9.26	2	59.1
16	18	42	24.85	12.549	25	52	44.3	10.99	3	0.1
17	18	47	25.49	12.503	25	47	59.8	12.70	3	1.2
18	18	52	24.98	12.453	25	42	34.5	14.40	3	2.3
19	18	57	23.23	12.400	25	36	28.6	16.08	3	3.3
20	19	2	20.17	12.344	25	29	42.5	17.75	3	4.3
21	19	7	15.73	12.284	25	22	16.5	19.40	3	5.3
22	19	12	9.84	12.223	25	14	11.1	21.03	3	6.3
23	19	17	2.43	12.158	25	5	26.8	22.64	3	7.2
24	19	21	53.43	12.091	24	56	4.3	24.23	3	8.1
25	19	26	42.78	12.020	24	46	3.9	25.80	3	9.0
26	19	31	30.41	11.947	24	35	26.2	27.34	3	9.8
27	19	36	16.27	11.873	24	24	11.8	28.85	3	10.6
28	19	41	0.29	11.794	24	12	21.4	30.34	3	11.4
29	19	45	42.41	11.714	23	59	55.5	31.80	3	12.2
30	19	50	22.57	11.631	23	46	54.9	33.24	3	12.9
31	19	55	0.70	11.545	23	33	20.1	34.64	3	13.6
32	19	59	36.74	11.457	23	19	12.0	36.02	3	14.3

### DECEMBER.

Day of month.	Apparent Right Ascension.			Var. of R. A. for 1 Hour.	Apparent Declination.			Var. of Dec. for 1 Hour	Meridian Passage.	
	Noon.			Noon.	Noon.			Noon.		
	h	m	s	s	°	'	"	"	h	m
1	19	55	0.70	11.545	23	33	20.1	34.64	3	13.6
2	19	59	36.74	11.457	23	19	12.0	36.02	3	14.3
3	20	4	10.64	11.366	23	4	31.2	37.37	3	14.9
4	20	8	42.34	11.273	22	49	18.4	38.68	3	15.5
5	20	13	11.77	11.177	22	33	34.4	39.98	3	16.0
6	20	17	38.86	11.079	22	17	20.1	41.21	3	16.5
7	20	22	3.56	10.978	22	0	36.4	42.42	3	17.0
8	20	26	25.82	10.875	21	43	24.0	43.60	3	17.4
9	20	30	45.58	10.770	21	25	43.7	44.74	3	17.7
10	20	35	2.78	10.662	21	7	36.4	45.85	3	18.1
11	20	39	17.37	10.552	20	49	2.8	46.93	3	18.4
12	20	43	29.27	10.439	20	30	3.9	47.96	3	18.6
13	20	47	38.44	10.324	20	10	40.8	48.94	3	18.8
14	20	51	44.83	10.207	19	50	54.4	49.91	3	19.0
15	20	55	48.38	10.087	19	30	45.3	50.83	3	19.1
16	20	59	49.04	9.966	19	10	14.5	51.71	3	19.2
17	21	3	46.78	9.843	18	49	23.2	52.55	3	19.1
18	21	7	41.53	9.718	18	28	12.3	53.35	3	19.0
19	21	11	33.25	9.590	18	6	42.3	54.12	3	18.9
20	21	15	21.88	9.460	17	44	54.7	54.83	3	18.7
21	21	19	7.35	9.328	17	22	50.2	55.51	3	18.5
22	21	22	49.63	9.194	17	0	30.0	56.15	3	18.3
23	21	26	28.67	9.058	16	37	55.0	56.75	3	18.1
24	21	30	4.41	8.920	16	15	6.1	57.31	3	17.8
25	21	33	36.81	8.779	15	52	4.3	57.82	3	17.4
26	21	37	5.80	8.636	15	28	50.7	58.29	3	16.9
27	21	40	31.33	8.489	15	5	26.4	58.71	3	16.4
28	21	43	53.31	8.340	14	41	52.5	59.10	3	15.8
29	21	47	11.69	8.189	14	18	9.9	59.43	3	15.1
30	21	50	26.39	8.035	13	54	19.8	59.73	3	14.4
31	21	53	37.32	7.875	13	30	22.5	59.97	3	13.7
32	21	56	44.41	7.713	13	6	20.1	60.19	3	12.9

Day of the Month,	2d.	7th.	12th.	17th.	22d.	27th.
Semidiameter	8.7	9.0	9.4	9.8	10.2	10.7
Hor. Parallax	8.9	9.1	9.5	9.9	10.3	10.8

Day of Month,	2d.	7th.	12th.	17th.	22d.	27th.	32d.
Semidiam.	11.2	11.8	12.5	13.2	14.0	14.9	15.9
Hor. Par.	11.3	11.9	12.5	13.3	14.1	15.0	16.1

## GREENWICH MEAN TIME.

JANUARY.						FEBRUARY.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	10 31 29.65	+0.511	+13 0 6.3	+2.99	15 44.3	1	10 13 46.96	-3.262	+15 43 6.5	+20.82	13 24.0
2	10 31 40.49	0.393	13 1 26.3	3.68	15 40.5	2	10 12 27.58	3.351	15 51 28.8	21.00	13 18.7
3	10 31 48.49	0.274	13 3 2.9	4.38	15 36.6	3	10 11 6.10	3.436	15 59 55.0	21.14	13 13.4
4	10 31 53.63	0.154	13 4 56.1	5.08	15 32.8	4	10 9 42.62	3.516	16 8 24.0	21.23	13 8.1
5	10 31 55.87	+0.032	13 7 6.1	5.78	15 28.9	5	10 8 17.27	3.591	16 16 54.5	21.28	13 2.7
6	10 31 55.15	-0.092	13 9 33.1	6.48	15 24.9	6	10 6 50.22	3.661	16 25 25.6	21.28	12 57.3
7	10 31 51.44	0.218	13 12 17.1	7.19	15 20.9	7	10 5 21.60	3.723	16 33 56.2	21.24	12 51.9
8	10 31 44.72	0.345	13 15 18.2	7.90	15 16.8	8	10 3 51.57	3.777	16 42 25.2	21.15	12 46.5
9	10 31 34.93	0.474	13 18 36.4	8.61	15 12.7	9	10 2 20.38	3.823	16 50 51.6	21.02	12 41.1
10	10 31 22.04	0.603	13 22 11.6	9.32	15 8.5	10	10 0 48.14	3.861	16 59 14.2	20.84	12 35.6
11	10 31 6.02	0.733	13 26 3.7	10.03	15 4.3	11	9 59 15.07	3.892	17 7 31.9	20.61	12 30.1
12	10 30 46.87	0.864	13 30 12.8	10.73	15 0.0	12	9 57 41.35	3.916	17 15 43.7	20.34	12 24.6
13	10 30 24.58	0.995	13 34 38.6	11.42	14 55.7	13	9 56 7.11	3.933	17 23 48.5	20.02	12 19.1
14	10 29 59.15	1.126	13 39 20.9	12.11	14 51.3	14	9 54 32.55	3.942	17 31 45.0	19.66	12 13.6
15	10 29 30.57	1.257	13 44 19.5	12.78	14 46.9	15	9 52 57.89	3.943	17 39 32.4	19.27	12 8.1
16	10 28 58.84	1.388	13 49 34.2	13.44	14 42.4	16	9 51 23.30	3.936	17 47 9.9	18.84	12 2.6
17	10 28 23.98	1.518	13 55 4.6	14.08	14 37.8	17	9 49 48.98	3.921	17 54 36.7	18.37	11 57.1
18	10 27 46.01	1.648	14 0 50.2	14.71	14 32.2	18	9 48 15.11	3.898	18 1 51.7	17.86	11 51.6
19	10 27 4.93	1.777	14 6 50.6	15.32	14 28.6	19	9 46 41.88	3.868	18 8 54.3	17.33	11 46.1
20	10 26 20.77	1.905	14 13 5.5	15.91	14 23.9	20	9 45 9.46	3.831	18 15 43.6	16.77	11 40.6
21	10 25 33.54	2.031	14 19 34.4	16.48	14 19.2	21	9 43 38.03	3.786	18 22 19.1	16.18	11 35.2
22	10 24 43.29	2.155	14 26 16.5	17.02	14 14.4	22	9 42 7.75	3.734	18 28 40.1	15.56	11 29.8
23	10 23 50.08	2.278	14 33 11.4	17.54	14 9.5	23	9 40 38.80	3.676	18 34 46.2	14.93	11 24.4
24	10 22 53.95	2.399	14 40 18.5	18.04	14 4.6	24	9 39 11.31	3.611	18 40 36.8	14.28	11 19.0
25	10 21 54.95	2.517	14 47 37.2	18.51	13 50.7	25	9 37 45.43	3.541	18 46 11.5	13.61	11 13.7
26	10 20 53.14	2.633	14 55 6.8	18.94	13 54.7	26	9 36 21.32	3.465	18 51 30.0	12.93	11 8.4
27	10 19 48.57	2.747	15 2 46.5	19.34	13 49.7	27	9 34 59.11	3.383	18 56 32.1	12.24	11 3.1
28	10 18 41.30	2.858	15 10 35.3	19.71	13 44.6	28	9 33 38.91	3.296	19 1 17.6	11.54	10 57.9
29	10 17 31.42	2.966	15 18 32.5	20.04	13 39.5	29	9 32 20.88	3.205	19 5 46.2	10.83	10 52.7
30	10 16 18.99	3.069	15 26 37.4	20.34	13 34.4	30	9 31 5.11	3.109	19 9 57.5	10.11	10 47.5
31	10 15 4.13	3.168	15 34 49.1	20.60	13 29.2	31	9 29 51.69	3.008	19 13 51.5	9.39	10 42.4
32	10 13 46.96	-3.262	+15 43 6.5	+20.82	13 24.0	32	9 28 40.73	-2.903	+19 17 28.1	+8.66	10 37.3
Day of the Month,						Day of the Month,					
		1st.	9th.	17th.	25th.			2d.	10th.	18th.	26th.
Semidiameter		5.8	6.2	6.6	7.0	Semidiameter		7.3	7.4	7.4	7.3
Horizontal Parallax		10.0	10.7	11.4	12.0	Horizontal Parallax		12.4	12.6	12.6	12.3

## GREENWICH MEAN TIME.

MARCH.						APRIL.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	9 32 20.88	-3.205	+19 5 46.2	+10.83	10 52.7	1	9 15 43.26	+0.590	+19 9 33.0	-8.77	8 34.9
2	9 31 5.11	3.109	19 9 57.5	10.11	10 47.5	2	9 15 58.79	0.702	19 5 56.9	9.24	8 31.2
3	9 29 51.69	3.008	19 13 51.5	9.39	10 42.4	3	9 16 16.98	0.813	19 2 9.6	9.71	8 27.6
4	9 28 40.73	2.903	19 17 28.1	8.66	10 37.3	4	9 16 37.78	0.922	18 58 11.1	10.17	8 24.0
5	9 27 32.35	2.794	19 20 47.3	7.93	10 32.2	5	9 17 1.18	1.029	18 54 1.8	10.62	8 20.5
6	9 26 26.63	2.681	19 23 49.0	7.20	10 27.2	6	9 17 27.12	1.134	18 49 41.7	11.06	8 17.0
7	9 25 23.67	2.565	19 26 33.4	6.48	10 22.3	7	9 17 55.56	1.237	18 45 10.9	11.49	8 13.6
8	9 24 23.53	2.445	19 29 0.5	5.76	10 17.4	8	9 18 26.45	1.338	18 40 29.9	11.92	8 10.2
9	9 23 26.29	2.322	19 31 10.3	5.05	10 12.5	9	9 18 59.77	1.437	18 35 38.7	12.34	8 6.8
10	9 22 32.01	2.198	19 33 2.9	4.34	10 7.7	10	9 19 35.45	1.534	18 30 37.4	12.76	8 3.5
11	9 21 40.75	2.071	19 34 38.5	3.63	10 2.9	11	9 20 13.45	1.630	18 25 26.2	13.17	8 0.2
12	9 20 52.54	1.948	19 35 57.2	2.93	9 58.2	12	9 20 53.73	1.724	18 20 5.2	13.58	7 56.9
13	9 20 7.42	1.812	19 36 59.3	2.24	9 53.6	13	9 21 36.22	1.816	18 14 34.6	13.98	7 53.7
14	9 19 25.45	1.681	19 37 44.9	1.56	9 49.0	14	9 22 20.89	1.906	18 8 54.5	14.37	7 50.5
15	9 18 46.65	1.549	19 38 14.2	0.89	9 44.4	15	9 23 7.71	1.994	18 3 5.0	14.75	7 47.4
16	9 18 11.03	1.417	19 38 27.5	+0.23	9 39.9	16	9 23 56.61	2.080	17 57 6.3	15.13	7 44.3
17	9 17 38.59	1.284	19 38 25.1	-0.42	9 35.5	17	9 24 47.54	2.163	17 50 58.6	15.51	7 41.2
18	9 17 9.35	1.151	19 38 7.2	1.06	9 31.1	18	9 25 40.43	2.244	17 44 41.9	15.88	7 38.2
19	9 16 43.32	1.018	19 37 34.1	1.69	9 26.7	19	9 26 35.26	2.324	17 38 16.4	16.25	7 35.2
20	9 16 20.47	0.887	19 36 46.0	2.31	9 22.4	20	9 27 31.97	2.402	17 31 42.1	16.61	7 32.2
21	9 16 0.76	0.756	19 35 43.4	2.91	9 18.2	21	9 28 30.52	2.477	17 24 59.3	16.96	7 29.2
22	9 15 44.17	0.626	19 34 26.4	3.50	9 14.0	22	9 29 30.84	2.550	17 18 8.0	17.31	7 26.3
23	9 15 30.67	0.497	19 32 55.6	4.07	9 9.9	23	9 30 32.90	2.621	17 11 8.4	17.66	7 23.4
24	9 15 20.26	0.369	19 31 11.1	4.64	9 5.8	24	9 31 36.64	2.690	17 4 0.5	18.00	7 20.5
25	9 15 12.90	0.243	19 29 13.1	5.19	9 1.8	25	9 32 42.03	2.758	16 56 44.5	18.34	7 17.7
26	9 15 8.56	-0.119	19 27 1.9	5.74	8 57.8	26	9 33 49.01	2.824	16 49 20.6	18.67	7 14.9
27	9 15 7.18	+0.004	19 24 37.8	6.27	8 53.8	27	9 34 57.56	2.888	16 41 48.6	19.00	7 12.1
28	9 15 8.72	0.125	19 22 1.1	6.79	8 49.9	28	9 36 7.63	2.951	16 34 8.7	19.33	7 9.3
29	9 15 13.13	0.244	19 19 12.0	7.30	8 46.1	29	9 37 19.19	3.012	16 26 21.0	19.66	7 6.6
30	9 15 20.39	0.361	19 16 10.8	7.80	8 42.3	30	9 38 32.19	3.072	16 18 25.6	19.98	7 3.9
31	9 15 30.44	0.476	19 12 57.7	8.29	8 38.6	31	9 39 46.62	3.130	16 10 22.4	20.30	7 1.2
32	9 15 43.26	+0.590	+19 9 33.0	-8.77	8 34.9	32	9 41 2.42	+3.187	+16 2 11.6	-20.61	6 58.5
Day of the Month,						Day of the Month,					
		6th.	14th.	22d.	30th.			7th.	15th.	23d.	31st.
Semidiameter		7".0	6".7	6".3	5".9	Semidiameter		5".5	5".1	4".8	4".5
Horizontal Parallax		11.8	11.2	10.5	9.9	Horizontal Parallax		9.2	8.6	8.0	7.6

## GREENWICH MEAN TIME.

MAY.						JUNE.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	h m s 9 39 46.62	+3.130	+16 10 22.4	-20.30	h m 7 1.2	1	h m s 10 27 21.47	+4.382	+11 2 35.9	-28.94	h m 5 46.8
2	9 41 2.42	3.187	16 2 11.6	20.61	6 58.5	2	10 29 6.96	4.409	10 50 58.6	29.18	5 44.6
3	9 42 19.56	3.242	15 53 53.2	20.92	6 55.9	3	10 30 53.10	4.436	10 39 15.5	29.42	5 42.4
4	9 43 38.02	3.297	15 45 27.4	21.23	6 53.3	4	10 32 39.88	4.462	10 27 26.8	29.66	5 40.2
5	9 44 57.79	3.351	15 36 54.1	21.54	6 50.7	5	10 34 27.29	4.488	10 15 32.4	29.89	5 38.1
6	9 46 18.82	3.403	15 28 13.5	21.85	6 48.1	6	10 36 15.31	4.514	10 3 32.4	30.12	5 36.0
7	9 47 41.09	3.454	15 19 25.5	22.16	6 45.5	7	10 38 3.94	4.539	9 51 26.9	30.35	5 33.9
8	9 49 4.56	3.503	15 10 30.2	22.46	6 42.9	8	10 39 53.16	4.563	9 39 15.9	30.58	5 31.8
9	9 50 29.20	3.550	15 1 27.5	22.76	6 40.4	9	10 41 42.96	4.587	9 26 59.5	30.80	5 29.7
10	9 51 54.99	3.597	14 52 17.7	23.06	6 37.9	10	10 43 33.33	4.611	9 14 37.7	31.02	5 27.6
11	9 53 21.92	3.644	14 43 0.9	23.36	6 35.4	11	10 45 24.26	4.634	9 2 10.6	31.23	5 25.5
12	9 54 49.96	3.690	14 33 37.0	23.65	6 32.9	12	10 47 15.74	4.657	8 49 38.4	31.45	5 23.4
13	9 56 19.07	3.735	14 24 6.1	23.94	6 30.5	13	10 49 7.77	4.679	8 37 1.0	31.66	5 21.3
14	9 57 49.22	3.778	14 14 28.2	24.23	6 28.1	14	10 51 0.33	4.701	8 24 18.5	31.87	5 19.2
15	9 59 20.39	3.819	14 4 43.5	24.51	6 25.7	15	10 52 53.41	4.722	8 11 31.0	32.08	5 17.2
16	10 0 52.53	3.860	13 54 51.9	24.79	6 23.3	16	10 54 46.99	4.743	7 58 38.7	32.28	5 15.2
17	10 2 25.63	3.900	13 44 53.6	25.07	6 20.9	17	10 56 41.05	4.763	7 45 41.5	32.48	5 13.1
18	10 3 59.68	3.938	13 34 48.6	25.35	6 18.5	18	10 58 35.60	4.783	7 32 39.6	32.68	5 11.1
19	10 5 34.64	3.975	13 24 37.0	25.63	6 16.1	19	11 0 30.63	4.803	7 19 33.0	32.88	5 9.1
20	10 7 10.47	4.011	13 14 18.9	25.90	6 13.8	20	11 2 26.12	4.822	7 6 21.8	33.07	5 7.1
21	10 8 47.16	4.046	13 3 54.3	26.17	6 11.5	21	11 4 22.07	4.841	6 53 6.1	33.25	5 5.1
22	10 10 24.68	4.080	12 53 23.3	26.43	6 9.2	22	11 6 18.47	4.860	6 39 46.0	33.43	5 3.1
23	10 12 3.01	4.113	12 42 46.0	26.69	6 6.9	23	11 8 15.32	4.878	6 26 21.5	33.61	5 1.1
24	10 13 42.13	4.146	12 32 2.5	26.95	6 4.6	24	11 10 12.61	4.897	6 12 52.8	33.79	4 59.1
25	10 15 22.02	4.178	12 21 12.7	27.21	6 2.3	25	11 12 10.33	4.915	5 59 19.8	33.96	4 57.1
26	10 17 2.67	4.209	12 10 16.8	27.46	6 0.0	26	11 14 8.48	4.933	5 45 42.7	34.13	4 55.1
27	10 18 44.06	4.239	11 59 14.9	27.71	5 57.8	27	11 16 7.07	4.951	5 32 1.5	34.30	4 53.1
28	10 20 26.16	4.269	11 48 7.0	27.96	5 55.6	28	11 18 6.10	4.969	5 18 16.4	34.47	4 51.2
29	10 22 8.96	4.298	11 36 53.0	28.21	5 53.4	29	11 20 5.56	4.987	5 4 27.3	34.63	4 49.3
30	10 23 52.46	4.326	11 25 33.1	28.45	5 51.2	30	11 22 5.44	5.005	4 50 34.2	34.79	4 47.3
31	10 25 36.63	4.354	11 14 7.4	28.70	5 49.0	31	11 24 5.74	5.022	4 36 37.4	34.95	4 45.4
32	10 27 21.47	+4.382	+11 2 35.9	-28.94	5 46.8	32	11 26 6.48	+5.039	+ 4 22 36.9	-35.11	4 43.5
Day of the Month,		1st.	9th.	17th.	25th.	Day of the Month,		2d.	10th.	18th.	26th.
Semidiameter		4.5	4.2	4.0	3.8	Semidiameter		3.6	3.5	3.3	3.2
Horizontal Parallax		7.6	7.2	6.8	6.5	Horizontal Parallax		6.2	5.9	5.7	5.4

## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	11 24 5.74	+5.029	4 36 37.4	-34.95	4 45.4	1	12 29 40.33	+5.556	3 0 0.6	-38.09	3 48.9
2	11 26 6.48	5.039	4 22 36.9	35.11	4 43.5	2	12 31 53.88	5.574	3 15 15.1	38.13	3 47.2
3	11 28 7.63	5.056	4 8 32.6	35.26	4 41.6	3	12 34 7.88	5.593	3 30 30.6	38.16	3 45.5
4	11 30 9.21	5.074	3 54 24.6	35.41	4 39.7	4	12 36 22.34	5.612	3 45 47.0	38.19	3 43.8
5	11 32 11.20	5.092	3 40 13.2	35.55	4 37.8	5	12 38 37.25	5.631	4 1 4.1	38.22	3 42.1
6	11 34 13.62	5.110	3 25 58.3	35.69	4 35.9	6	12 40 52.62	5.651	4 16 21.9	38.24	3 40.4
7	11 36 16.46	5.128	3 11 39.9	35.83	4 34.0	7	12 43 8.46	5.670	4 31 40.2	38.26	3 38.7
8	11 38 19.72	5.145	2 57 18.2	35.97	4 32.1	8	12 45 24.76	5.689	4 46 58.8	38.28	3 37.0
9	11 40 23.40	5.162	2 42 53.2	36.10	4 30.2	9	12 47 41.53	5.708	5 2 17.7	38.29	3 35.3
10	11 42 27.49	5.179	2 28 25.1	36.23	4 28.3	10	12 49 58.76	5.726	5 17 36.7	38.29	3 33.7
11	11 44 32.00	5.196	2 13 53.9	36.36	4 26.4	11	12 52 16.45	5.748	5 32 55.8	38.29	3 32.1
12	11 46 36.92	5.213	1 59 19.7	36.48	4 24.5	12	12 54 34.62	5.768	5 48 14.8	38.28	3 30.5
13	11 48 42.25	5.230	1 44 42.6	36.60	4 22.7	13	12 56 53.27	5.787	6 3 33.6	38.27	3 28.8
14	11 50 48.00	5.247	1 30 2.8	36.72	4 20.9	14	12 59 12.39	5.807	6 18 52.0	38.26	3 27.2
15	11 52 54.14	5.264	1 15 20.3	36.83	4 19.1	15	13 1 32.00	5.827	6 34 10.0	38.24	3 25.6
16	11 55 0.68	5.281	1 0 35.1	36.94	4 17.3	16	13 3 52.09	5.847	6 49 27.4	38.21	3 24.0
17	11 57 7.62	5.298	0 45 47.4	37.04	4 15.4	17	13 6 12.66	5.867	7 4 44.0	38.18	3 22.4
18	11 59 14.96	5.315	0 30 57.3	37.14	4 13.6	18	13 8 33.72	5.888	7 19 59.8	38.14	3 20.8
19	12 1 22.70	5.332	0 16 5.0	37.23	4 11.8	19	13 10 55.27	5.909	7 35 14.6	38.09	3 19.2
20	12 3 30.85	5.348	0 1 10.5	37.32	4 10.0	20	13 13 17.32	5.930	7 50 28.3	38.04	3 17.6
21	12 5 39.39	5.364	0 13 46.1	37.40	4 8.2	21	13 15 39.87	5.951	8 5 40.7	37.99	3 16.0
22	12 7 48.33	5.380	0 28 44.7	37.48	4 6.4	22	13 18 2.92	5.972	8 20 51.8	37.93	3 14.5
23	12 9 57.66	5.397	0 43 45.2	37.56	4 4.6	23	13 20 26.49	5.993	8 36 1.4	37.87	3 13.0
24	12 12 7.39	5.414	0 58 47.6	37.63	4 2.8	24	13 22 50.57	6.015	8 51 9.4	37.80	3 11.4
25	12 14 17.54	5.431	1 13 51.7	37.70	4 1.0	25	13 25 15.18	6.037	9 6 15.6	37.72	3 9.9
26	12 16 28.10	5.448	1 28 57.4	37.77	3 59.3	26	13 27 40.33	6.060	9 21 20.0	37.64	3 8.4
27	12 18 39.08	5.466	1 44 4.6	37.83	3 57.6	27	13 30 6.02	6.082	9 36 22.4	37.55	3 6.9
28	12 20 50.48	5.484	1 59 13.2	37.89	3 55.8	28	13 32 32.26	6.105	9 51 22.6	37.46	3 5.4
29	12 23 2.29	5.502	2 14 23.2	37.95	3 54.0	29	13 34 59.05	6.128	10 6 20.6	37.37	3 3.9
30	12 25 14.53	5.520	2 29 34.6	38.00	3 52.3	30	13 37 26.40	6.152	10 21 16.4	37.27	3 2.4
31	12 27 27.21	5.538	2 44 47.1	38.05	3 50.6	31	13 39 54.32	6.175	10 36 9.7	37.16	3 0.9
32	12 29 40.33	+5.556	3 0 0.6	-38.09	3 48.9	32	13 42 22.51	+6.199	-10 51 0.3	-37.05	2 59.4
Day of the Month,						Day of the Month,					
		4th.	12th.	20th.	28th.			5th.	13th.	21st.	29th.
Semidiameter		3'.1	3'.0	2'.9	2'.8	Semidiameter		2'.7	2'.7	2'.6	2'.6
Horizontal Parallax		5.2	5.1	4.9	4.8	Horizontal Parallax		4.7	4.5	4.4	4.4

GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
Noon.	Noon.	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.	Noon.		
h m s.	s	° ' "	h m	h m		h m s.	s	° ' "	h m		
1 13 42 22.81	+6.199	10 51 0.3	-37.05	2 59.4	1 15 1 24.05	+6.996	-17 43 26.8	-30.66	2 20.3		
2 13 44 51.88	6.223	11 5 48.2	36.93	2 58.0	2 15 4 12.30	7.025	17 55 39.0	30.34	2 19.2		
3 13 47 21.54	6.248	11 20 33.3	36.81	2 56.6	3 15 7 1.24	7.054	18 7 43.6	30.02	2 18.0		
4 13 49 51.79	6.272	11 35 15.3	36.68	2 55.1	4 15 9 50.88	7.083	18 19 40.1	29.68	2 16.9		
5 13 52 22.63	6.297	11 49 54.1	36.55	2 53.7	5 15 12 41.22	7.112	18 31 28.5	29.33	2 15.8		
6 13 54 54.08	6.322	12 4 29.7	36.41	2 52.3	6 15 15 32.25	7.141	18 43 8.6	28.98	2 14.7		
7 13 57 26.12	6.347	12 19 1.7	36.26	2 50.9	7 15 18 23.97	7.170	18 54 40.3	28.63	2 13.6		
8 13 59 58.76	6.372	12 33 30.1	36.10	2 49.5	8 15 21 16.39	7.199	19 6 3.3	28.27	2 12.5		
9 14 2 31.98	6.398	12 47 54.7	35.94	2 48.1	9 15 24 9.51	7.228	19 17 17.4	27.90	2 11.5		
10 14 5 5.82	6.423	13 2 15.4	35.77	2 46.7	10 15 27 3.33	7.257	19 28 22.4	27.52	2 10.4		
11 14 7 40.30	6.449	13 16 32.1	35.60	2 45.3	11 15 29 57.83	7.286	19 39 18.2	27.13	2 9.4		
12 14 10 15.40	6.474	13 30 44.4	35.42	2 43.9	12 15 32 53.01	7.315	19 50 4.6	26.74	2 8.4		
13 14 12 51.12	6.500	13 44 52.3	35.23	2 42.6	13 15 35 48.87	7.343	20 0 41.3	26.33	2 7.4		
14 14 15 27.45	6.526	13 58 55.6	35.03	2 41.3	14 15 38 45.42	7.371	20 11 8.2	25.91	2 6.4		
15 14 18 4.41	6.552	14 12 54.2	34.83	2 40.0	15 15 41 42.65	7.399	20 21 25.2	25.49	2 5.4		
16 14 20 41.99	6.578	14 26 47.8	34.62	2 38.7	16 15 44 40.56	7.427	20 31 31.9	25.06	2 4.4		
17 14 23 20.20	6.605	14 40 36.2	34.40	2 37.4	17 15 47 39.14	7.455	20 41 28.2	24.62	2 3.4		
18 14 25 59.04	6.631	14 54 19.3	34.18	2 36.1	18 15 50 38.40	7.483	20 51 14.0	24.17	2 2.5		
19 14 28 38.52	6.658	15 7 57.1	33.95	2 34.8	19 15 53 38.32	7.511	21 0 49.1	23.72	2 1.6		
20 14 31 18.65	6.685	15 21 29.2	33.71	2 33.5	20 15 56 38.90	7.539	21 10 13.2	23.26	2 0.7		
21 14 33 59.43	6.713	15 34 55.6	33.47	2 32.3	21 15 59 40.15	7.567	21 19 26.2	22.80	1 59.7		
22 14 36 40.86	6.740	15 48 16.0	33.22	2 31.0	22 16 2 42.06	7.594	21 28 28.0	22.33	1 58.8		
23 14 39 22.95	6.768	16 1 30.3	32.96	2 29.8	23 16 5 44.63	7.621	21 37 18.4	21.85	1 57.9		
24 14 42 5.71	6.796	16 14 38.4	32.70	2 28.6	24 16 8 47.86	7.648	21 45 57.2	21.36	1 57.0		
25 14 44 49.15	6.824	16 27 40.2	32.43	2 27.3	25 16 11 51.74	7.676	21 54 24.2	20.87	1 56.1		
26 14 47 33.26	6.852	16 40 35.4	32.15	2 26.1	26 16 14 56.28	7.703	22 2 39.3	20.38	1 55.2		
27 14 50 18.05	6.881	16 53 23.8	31.87	2 24.9	27 16 18 1.46	7.730	22 10 42.3	19.87	1 54.4		
28 14 53 3.51	6.909	17 6 5.3	31.58	2 23.7	28 16 21 7.28	7.756	22 18 33.1	19.35	1 53.6		
29 14 55 49.66	6.938	17 18 39.8	31.28	2 22.5	29 16 24 13.73	7.782	22 26 11.5	18.83	1 52.8		
30 14 58 36.51	6.967	17 31 7.0	30.97	2 21.4	30 16 27 20.81	7.808	22 33 37.2	18.30	1 51.9		
31 15 1 24.05	6.996	17 43 26.8	30.66	2 20.3	31 16 30 28.52	7.834	22 40 50.1	17.78	1 51.1		
32 15 4 12.30	+7.026	-17 55 39.0	-30.34	2 19.2	32 16 33 36.85	+7.859	-22 47 50.0	-17.22	1 50.3		
Day of the Month,						Day of the Month,					
		6th.	14th.	22d.	30th.			6th.	16th.	24th.	32d.
Semidiameter		2.5	2.5	2.4	2.4	Semidiameter		2.4	2.3	2.3	2.3
Horizontal Parallax		4.3	4.2	4.1	4.1	Horizontal Parallax		4.0	4.0	3.9	3.9

## GREENWICH MEAN TIME.

NOVEMBER.						DECEMBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	16 33 36.55	+7.850	22 47 50.0	-17.22	1 50.3	1	18 11 31.50	+8.375	24 25 47.2	+1.61	1 30.0
2	16 36 45.77	7.884	22 54 36.9	16.67	1 49.5	2	18 14 52.59	8.383	24 25 0.9	2.29	1 29.4
3	16 39 55.29	7.909	23 1 10.5	16.11	1 48.7	3	18 18 13.87	8.390	24 23 58.3	2.97	1 28.8
4	16 43 5.39	7.933	23 7 30.7	15.55	1 47.9	4	18 21 35.31	8.396	24 22 39.2	3.65	1 28.2
5	16 46 16.07	7.956	23 13 37.4	14.98	1 47.2	5	18 24 56.86	8.401	24 21 3.6	4.34	1 27.6
6	16 49 27.30	7.979	23 19 30.4	14.41	1 46.4	6	18 28 18.51	8.405	24 19 11.5	5.03	1 27.0
7	16 52 39.08	8.002	23 25 9.5	13.83	1 45.7	7	18 31 40.27	8.408	24 17 2.8	5.79	1 26.4
8	16 55 51.39	8.024	23 30 34.6	13.24	1 45.0	8	18 35 2.11	8.411	24 14 37.5	6.41	1 25.8
9	16 59 4.22	8.045	23 35 45.4	12.65	1 44.3	9	18 38 24.01	8.413	24 11 55.6	7.10	1 25.2
10	17 2 17.56	8.068	23 40 41.9	12.05	1 43.5	10	18 41 45.95	8.415	24 8 57.3	7.78	1 24.7
11	17 5 31.40	8.087	23 45 23.9	11.44	1 42.8	11	18 45 7.92	8.415	24 5 42.5	8.47	1 24.2
12	17 8 45.72	8.107	23 49 51.3	10.82	1 42.1	12	18 48 29.88	8.415	24 2 11.3	9.15	1 23.6
13	17 12 0.51	8.126	23 54 4.0	10.21	1 41.4	13	18 51 51.84	8.414	23 58 23.6	9.84	1 23.0
14	17 15 15.75	8.145	23 58 1.7	9.58	1 40.7	14	18 55 13.78	8.413	23 54 19.4	10.52	1 22.4
15	17 18 31.43	8.163	24 1 44.4	8.95	1 40.0	15	18 58 35.67	8.411	23 49 58.8	11.21	1 21.8
16	17 21 47.55	8.181	24 5 11.9	8.32	1 39.4	16	19 1 57.49	8.408	23 45 21.8	11.89	1 21.2
17	17 25 4.08	8.198	24 8 24.3	7.69	1 38.7	17	19 5 19.23	8.404	23 40 28.5	12.57	1 20.6
18	17 28 21.00	8.214	24 11 21.4	7.05	1 38.0	18	19 8 40.88	8.400	23 35 19.0	13.25	1 20.0
19	17 31 38.31	8.230	24 14 3.2	6.41	1 37.3	19	19 12 2.42	8.395	23 29 53.2	13.93	1 19.4
20	17 34 56.00	8.245	24 16 29.5	5.76	1 36.7	20	19 15 23.85	8.390	23 24 11.1	14.60	1 18.9
21	17 38 14.06	8.260	24 18 40.2	5.11	1 36.1	21	19 18 45.15	8.384	23 18 12.8	15.27	1 18.4
22	17 41 32.47	8.274	24 20 35.2	4.45	1 35.5	22	19 22 6.30	8.378	23 11 58.6	15.93	1 17.8
23	17 44 51.21	8.288	24 22 14.4	3.79	1 34.9	23	19 25 27.29	8.371	23 5 28.5	16.59	1 17.2
24	17 48 10.27	8.301	24 23 37.6	3.12	1 34.2	24	19 28 48.13	8.364	22 58 42.5	17.25	1 16.6
25	17 51 29.65	8.313	24 24 44.7	2.45	1 33.6	25	19 32 8.77	8.356	22 51 40.7	17.91	1 16.0
26	17 54 49.32	8.325	24 25 35.6	1.78	1 33.0	26	19 35 29.21	8.347	22 44 23.2	18.57	1 15.4
27	17 58 9.27	8.336	24 26 10.4	1.11	1 32.4	27	19 38 49.43	8.338	22 36 50.0	19.22	1 14.8
28	18 1 29.48	8.347	24 26 28.9	-0.43	1 31.8	28	19 42 9.43	8.328	22 29 1.2	19.88	1 14.2
29	18 4 49.93	8.357	24 26 31.2	+0.25	1 31.2	29	19 45 29.20	8.318	22 20 57.1	20.50	1 13.6
30	18 8 10.61	8.366	24 26 17.3	0.93	1 30.6	30	19 48 48.73	8.308	22 12 37.7	21.13	1 12.9
31	18 11 31.50	8.375	24 25 47.2	1.61	1 30.0	31	19 52 8.00	8.297	22 4 3.2	21.76	1 12.3
32	18 14 52.59	+8.383	-24 25 0.9	+2.29	1 29.4	32	19 55 26.99	+8.285	-21 55 13.6	+22.39	1 11.7
Day of the Month,						Day of the Month,					
		1st.	9th.	17th.	25th.			3d.	11th.	19th.	27th.
Semidiameter		2'3	2'3	2'3	2'3	Semidiameter		2'2	2'2	2'2	2'2
Horizontal Parallax		3.9	3.9	3.8	3.8	Horizontal Parallax		3.8	3.8	3.7	3.7

## GREENWICH MEAN TIME.

JANUARY.						FEBRUARY.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	h m s 0 24 40.81	+0.972	+ 1 15 17.4	+7.02	h m 5 39.2	1	h m s 0 41 10.54	+1.641	+ 3 9 12.2	+11.00	h m 3 53.7
2	0 25 4.45	0.998	1 18 7.9	7.18	5 35.6	2	0 41 50.13	1.658	3 13 37.4	11.10	3 50.4
3	0 25 28.71	1.024	1 21 2.1	7.34	5 32.1	3	0 42 30.12	1.675	3 18 4.9	11.19	3 47.1
4	0 25 53.58	1.049	1 24 0.0	7.49	5 28.6	4	0 43 10.52	1.692	3 22 34.6	11.28	3 43.8
5	0 26 19.05	1.074	1 27 1.7	7.64	5 25.1	5	0 43 51.31	1.708	3 27 6.5	11.37	3 40.6
6	0 26 45.13	1.099	1 30 7.1	7.79	5 21.6	6	0 44 32.49	1.724	3 31 40.5	11.46	3 37.4
7	0 27 11.80	1.123	1 33 16.0	7.94	5 18.1	7	0 45 14.05	1.740	3 36 16.6	11.55	3 34.1
8	0 27 39.05	1.147	1 36 28.5	8.09	5 14.6	8	0 45 55.99	1.755	3 40 54.7	11.63	3 30.9
9	0 28 6.88	1.171	1 39 44.5	8.24	5 11.1	9	0 46 38.29	1.770	3 45 34.7	11.71	3 27.7
10	0 28 35.29	1.195	1 43 4.1	8.39	5 7.6	10	0 47 20.96	1.785	3 50 16.7	11.79	3 24.5
11	0 29 4.27	1.219	1 46 27.1	8.54	5 4.2	11	0 48 3.98	1.800	3 55 0.5	11.87	3 21.3
12	0 29 33.80	1.242	1 49 53.6	8.68	5 0.7	12	0 48 47.35	1.815	3 59 46.2	11.94	3 18.1
13	0 30 3.89	1.265	1 53 23.5	8.82	4 57.3	13	0 49 31.07	1.829	4 4 33.6	12.01	3 14.9
14	0 30 34.52	1.288	1 56 56.6	8.95	4 53.9	14	0 50 15.13	1.843	4 9 22.7	12.08	3 11.7
15	0 31 5.69	1.310	2 0 32.9	9.08	4 50.5	15	0 50 59.52	1.857	4 14 13.5	12.15	3 8.5
16	0 31 37.39	1.333	2 4 12.4	9.21	4 47.1	16	0 51 44.23	1.870	4 19 5.9	12.22	3 5.3
17	0 32 9.61	1.354	2 7 55.0	9.34	4 43.7	17	0 52 29.26	1.883	4 23 59.8	12.28	3 2.1
18	0 32 42.35	1.375	2 11 40.7	9.47	4 40.3	18	0 53 14.60	1.896	4 28 55.3	12.34	2 58.9
19	0 33 15.60	1.396	2 15 29.4	9.60	4 36.9	19	0 54 0.24	1.908	4 33 52.2	12.40	2 55.7
20	0 33 49.34	1.416	2 19 21.1	9.72	4 33.5	20	0 54 46.18	1.920	4 38 50.5	12.46	2 52.5
21	0 34 23.57	1.436	2 23 15.7	9.84	4 30.2	21	0 55 32.40	1.932	4 43 50.2	12.51	2 49.4
22	0 34 58.29	1.456	2 27 13.1	9.96	4 26.8	22	0 56 18.90	1.944	4 48 51.2	12.57	2 46.2
23	0 35 33.49	1.476	2 31 13.3	10.07	4 23.4	23	0 57 5.69	1.956	4 53 53.4	12.62	2 43.0
24	0 36 9.15	1.496	2 35 16.3	10.18	4 20.1	24	0 57 52.76	1.967	4 58 56.9	12.67	2 39.9
25	0 36 45.28	1.515	2 39 21.9	10.29	4 16.8	25	0 58 40.09	1.978	5 4 1.6	12.72	2 36.8
26	0 37 21.86	1.534	2 43 30.2	10.40	4 13.5	26	0 59 27.68	1.989	5 9 7.5	12.77	2 33.7
27	0 37 58.89	1.552	2 47 41.0	10.51	4 10.2	27	1 0 15.54	2.000	5 14 14.4	12.82	2 30.5
28	0 38 36.36	1.570	2 51 54.4	10.61	4 6.9	28	1 1 3.65	2.010	5 19 22.3	12.86	2 27.4
29	0 39 14.26	1.588	2 56 10.3	10.71	4 3.6	29	1 1 52.01	2.020	5 24 31.3	12.90	2 24.3
30	0 39 52.00	1.606	3 0 28.6	10.81	4 0.3	30	1 2 40.61	2.030	5 29 41.2	12.94	2 21.1
31	0 40 31.36	1.624	3 4 49.2	10.91	3 57.0	31	1 3 29.45	2.040	5 34 52.1	12.98	2 18.0
32	0 41 10.54	+1.641	+ 3 9 12.2	+11.00	3 53.7	32	1 4 18.52	+2.050	+ 5 40 3.9	+13.02	2 14.9
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		18".8	18".2	17".7	17".3	Polar Semidiameter		17".2	16".8	16".5	16".2
Horizontal Parallax		1.7	1.7	1.6	1.6	Horizontal Parallax		1.6	1.6	1.5	1.5



## GREENWICH MEAN TIME.

MARCH.						APRIL.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	h m s	"	° ' "	"	h m	1	h m s	"	° ' "	"	h m
1	1 1 52.01	+2.030	+ 5 24 31.3	+12.90	2 24.3	1	1 28 27.42	+2.235	+ 8 8 53.2	+13.35	0 48.8
2	1 2 40.61	2.030	5 29 41.2	12.94	2 21.1	2	1 29 21.12	2.239	8 14 13.5	13.34	0 45.8
3	1 3 29.45	2.040	5 34 52.1	12.98	2 18.0	3	1 30 14.92	2.243	8 19 33.6	13.33	0 42.7
4	1 4 18.52	2.050	5 40 3.9	13.02	2 14.9	4	1 31 8.80	2.247	8 24 53.3	13.32	0 39.7
5	1 5 7.83	2.060	5 45 16.6	13.05	2 11.8	5	1 32 2.76	2.250	8 30 12.7	13.31	0 36.6
6	1 5 57.36	2.069	5 50 30.2	13.08	2 8.7	6	1 32 56.80	2.253	8 35 31.8	13.29	0 33.6
7	1 6 47.12	2.078	5 55 44.5	13.11	2 5.6	7	1 33 50.92	2.256	8 40 50.5	13.28	0 30.6
8	1 7 37.09	2.087	6 0 59.5	13.14	2 2.5	8	1 34 45.11	2.259	8 46 8.8	13.26	0 27.5
9	1 8 27.28	2.096	6 6 15.2	13.17	1 59.4	9	1 35 39.37	2.262	8 51 26.7	13.24	0 24.5
10	1 9 17.68	2.104	6 11 31.5	13.20	1 56.3	10	1 36 33.69	2.265	8 56 44.1	13.22	0 21.5
11	1 10 8.27	2.112	6 16 48.4	13.23	1 53.2	11	1 37 28.07	2.267	9 2 1.0	13.20	0 18.5
12	1 10 59.06	2.120	6 22 5.9	13.25	1 50.1	12	1 38 22.50	2.269	9 7 17.3	13.18	0 15.4
13	1 11 50.03	2.128	6 27 24.0	13.27	1 47.0	13	1 39 16.98	2.271	9 12 33.0	13.15	0 12.4
14	1 12 41.18	2.135	6 32 42.6	13.29	1 43.9	14	1 40 11.50	2.272	9 17 48.1	13.12	0 9.4
15	1 13 32.51	2.142	6 38 1.6	13.31	1 40.8	15	1 41 6.05	2.273	9 13 2.6	13.09	0 6.3
16	1 14 24.01	2.149	6 43 21.0	13.33	1 37.7	16	1 42 0.63	2.274	9 28 16.3	13.06	0 3.3
17	1 15 15.67	2.156	6 48 40.8	13.34	1 34.6	17	1 42 55.24	2.275	9 33 29.3	13.03	0 0.3
18	1 16 7.50	2.163	6 54 0.9	13.35	1 31.6	18	1 43 49.87	2.276	9 38 41.5	12.99	23 54.3
19	1 16 59.49	2.170	6 59 21.3	13.36	1 28.5	19	1 44 44.52	2.277	9 43 52.9	12.96	23 51.2
20	1 17 51.63	2.176	7 4 41.9	13.37	1 25.5	20	1 45 39.18	2.277	9 49 3.5	12.93	23 48.2
21	1 18 43.92	2.182	7 10 2.6	13.37	1 22.4	21	1 46 33.85	2.278	9 54 13.3	12.89	23 45.2
22	1 19 36.35	2.188	7 15 23.5	13.37	1 19.3	22	1 47 28.52	2.278	9 59 22.2	12.85	23 42.2
23	1 20 28.92	2.194	7 20 44.5	13.38	1 16.3	23	1 48 23.20	2.278	10 4 30.2	12.81	23 39.1
24	1 21 21.62	2.199	7 26 5.6	13.38	1 13.2	24	1 49 17.88	2.277	10 9 37.3	12.77	23 36.1
25	1 22 14.45	2.204	7 31 26.7	13.38	1 10.1	25	1 50 12.55	2.277	10 14 43.4	12.73	23 33.1
26	1 23 7.40	2.209	7 36 47.9	13.38	1 7.1	26	1 51 7.20	2.276	10 19 48.5	12.69	23 30.1
27	1 24 0.47	2.214	7 42 9.0	13.38	1 4.0	27	1 52 1.84	2.276	10 24 52.6	12.65	23 27.0
28	1 24 53.65	2.219	7 47 30.1	13.37	1 1.0	28	1 52 56.47	2.275	10 29 55.6	12.61	23 24.0
29	1 25 46.94	2.223	7 52 51.1	13.37	0 57.9	29	1 53 51.08	2.274	10 34 57.6	12.56	23 21.0
30	1 26 40.33	2.227	7 58 12.0	13.37	0 54.9	30	1 54 45.65	2.273	10 39 58.6	12.51	23 17.9
31	1 27 33.82	2.231	8 3 32.7	13.36	0 51.9	31	1 55 40.20	2.272	10 44 58.4	12.47	23 14.9
32	1 28 27.42	+2.235	+ 8 8 53.2	+13.35	0 48.8	32	1 56 34.72	+2.271	+10 49 57.2	+12.42	23 11.9
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		16.2	16.0	15.8	15.7	Polar Semidiameter		15.7	15.6	15.6	15.6
Horizontal Parallax		1.5	1.5	1.5	1.4	Horizontal Parallax		1.4	1.4	1.4	1.4

## GREENWICH MEAN TIME.

MAY.						JUNE.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	1 55 40.20	+2.272	+10 44 58.4	+12.47	23 14.9	1	2 23 11.21	+2.134	+13 8 23.9	+10.50	21 40.4
2	1 56 34.72	2.271	10 49 57.2	12.42	23 11.9	2	2 24 2.34	2.126	13 12 35.1	10.43	21 37.3
3	1 57 29.21	2.269	10 54 54.7	12.37	23 8.9	3	2 24 53.28	2.118	13 16 44.4	10.35	21 34.2
4	1 58 23.65	2.267	10 59 51.1	12.32	23 5.8	4	2 25 44.04	2.110	13 20 51.9	10.27	21 31.1
5	1 59 18.05	2.265	11 4 46.3	12.27	23 2.8	5	2 26 34.60	2.102	13 24 57.5	10.19	21 28.0
6	2 0 12.39	2.263	11 9 40.2	12.22	22 59.8	6	2 27 24.96	2.093	13 29 1.2	10.11	21 24.9
7	2 1 6.68	2.261	11 14 32.9	12.17	22 56.8	7	2 28 15.11	2.084	13 33 2.9	10.03	21 21.8
8	2 2 0.90	2.258	11 19 24.3	12.11	22 53.7	8	2 29 5.04	2.075	13 37 2.6	9.95	21 18.7
9	2 2 55.06	2.255	11 24 14.4	12.06	22 50.7	9	2 29 54.75	2.066	13 41 0.3	9.86	21 15.6
10	2 3 49.15	2.252	11 29 3.1	12.00	22 47.7	10	2 30 44.23	2.056	13 44 56.0	9.78	21 12.5
11	2 4 43.17	2.249	11 33 50.4	11.94	22 44.6	11	2 31 33.47	2.046	13 48 49.6	9.70	21 9.3
12	2 5 37.10	2.245	11 38 36.4	11.88	22 41.6	12	2 32 22.47	2.036	13 52 41.1	9.61	21 6.2
13	2 6 30.95	2.241	11 43 20.9	11.82	22 38.6	13	2 33 11.23	2.026	13 56 30.6	9.52	21 3.1
14	2 7 24.70	2.237	11 48 4.0	11.76	22 35.5	14	2 33 59.73	2.015	14 0 18.0	9.43	21 0.0
15	2 8 18.36	2.233	11 52 45.5	11.70	22 32.5	15	2 34 47.97	2.004	14 4 3.2	9.34	20 56.9
16	2 9 11.91	2.229	11 57 25.6	11.63	22 29.4	16	2 35 35.95	1.993	14 7 46.3	9.25	20 53.7
17	2 10 5.36	2.224	12 2 4.1	11.57	22 26.4	17	2 36 23.66	1.982	14 11 27.2	9.16	20 50.6
18	2 10 58.70	2.219	12 6 41.1	11.51	22 23.3	18	2 37 11.10	1.970	14 15 5.9	9.07	20 47.4
19	2 11 51.92	2.214	12 11 16.5	11.44	22 20.3	19	2 37 58.28	1.958	14 18 42.5	8.98	20 44.3
20	2 12 45.01	2.209	12 15 50.3	11.37	22 17.2	20	2 38 45.15	1.946	14 22 16.9	8.89	20 41.1
21	2 13 37.97	2.204	12 20 22.5	11.30	22 14.1	21	2 39 31.70	1.934	14 25 49.1	8.79	20 37.9
22	2 14 30.81	2.199	12 24 53.0	11.23	22 11.1	22	2 40 17.98	1.922	14 29 19.0	8.70	20 34.8
23	2 15 23.52	2.193	12 29 21.8	11.16	22 8.0	23	2 41 3.95	1.909	14 32 46.7	8.61	20 31.6
24	2 16 16.09	2.187	12 33 49.0	11.09	22 4.9	24	2 41 49.62	1.896	14 36 12.2	8.52	20 28.4
25	2 17 8.52	2.181	12 38 14.4	11.02	22 1.9	25	2 42 34.97	1.883	14 39 35.4	8.43	20 25.2
26	2 18 0.80	2.175	12 42 38.2	10.95	21 58.8	26	2 43 20.01	1.869	14 42 56.4	8.33	20 22.0
27	2 18 52.94	2.169	12 47 0.3	10.88	21 55.8	27	2 44 4.71	1.855	14 46 15.0	8.23	20 18.8
28	2 19 44.92	2.162	12 51 20.6	10.80	21 52.7	28	2 44 49.08	1.841	14 49 31.3	8.14	20 15.6
29	2 20 36.75	2.155	12 55 39.2	10.73	21 49.7	29	2 45 33.12	1.827	14 52 45.3	8.04	20 12.4
30	2 21 28.41	2.148	12 59 55.9	10.66	21 46.6	30	2 46 16.81	1.812	14 55 57.0	7.94	20 9.2
31	2 22 19.90	2.141	13 4 10.8	10.58	21 43.5	31	2 47 0.15	1.797	14 59 6.3	7.84	20 6.0
32	2 23 11.21	+2.134	+13 8 23.9	+10.50	21 40.4	32	2 47 43.13	+1.783	+15 2 13.3	+7.74	20 2.8
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		15'.6	15'.7	15'.9	16'.1	Polar Semidiameter		16'.1	16'.3	16'.6	17'.0
Horizontal Parallax		1.4	1.5	1.5	1.5	Horizontal Parallax		1.5	1.5	1.5	1.6

## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	2 47 0.15	+1.797	+14 59 6.3	+7.84	20 6.0	1	3 5 48.50	+1.186	+16 16 2.9	+4.48	18 22.6
2	2 47 43.13	1.782	15 2 13.3	7.74	20 2.8	2	3 6 16.69	1.161	16 17 49.1	4.36	18 19.2
3	2 48 25.75	1.767	15 5 17.8	7.64	19 59.6	3	3 6 44.28	1.136	16 19 32.5	4.24	18 15.7
4	2 49 7.99	1.751	15 8 19.9	7.54	19 56.4	4	3 7 11.25	1.111	16 21 13.1	4.12	18 12.2
5	2 49 49.85	1.735	15 11 19.6	7.44	19 53.1	5	3 7 37.61	1.085	16 22 50.9	4.00	18 8.7
6	2 50 31.31	1.719	15 14 16.9	7.34	19 49.8	6	3 8 3.34	1.059	16 24 25.8	3.89	18 5.2
7	2 51 12.38	1.703	15 17 11.7	7.23	19 46.6	7	3 8 28.44	1.032	16 25 57.9	3.77	18 1.7
8	2 51 53.04	1.686	15 20 4.0	7.13	19 43.3	8	3 8 52.90	1.005	16 27 27.1	3.65	17 58.2
9	2 52 33.29	1.669	15 22 53.9	7.03	19 40.1	9	3 9 16.71	0.978	16 28 53.5	3.53	17 54.6
10	2 53 13.12	1.651	15 25 41.2	6.93	19 36.8	10	3 9 39.86	0.951	16 30 16.9	3.41	17 51.0
11	2 53 52.51	1.633	15 28 26.1	6.82	19 33.5	11	3 10 2.35	0.923	16 31 37.4	3.29	17 47.4
12	2 54 31.47	1.615	15 31 8.4	6.72	19 30.2	12	3 10 24.18	0.895	16 32 55.0	3.17	17 43.8
13	2 55 9.99	1.596	15 33 48.2	6.61	19 26.9	13	3 10 45.33	0.867	16 34 9.7	3.05	17 40.2
14	2 55 48.05	1.577	15 36 25.3	6.50	19 23.6	14	3 11 5.80	0.838	16 35 21.4	2.93	17 36.6
15	2 56 25.66	1.558	15 38 59.9	6.39	19 20.3	15	3 11 25.58	0.809	16 36 30.2	2.81	17 33.0
16	2 57 2.81	1.538	15 41 31.9	6.28	19 16.9	16	3 11 44.67	0.780	16 37 36.0	2.68	17 29.4
17	2 57 39.48	1.518	15 44 1.3	6.17	19 13.6	17	3 12 3.06	0.751	16 38 38.9	2.56	17 25.8
18	2 58 15.68	1.498	15 46 28.1	6.06	19 10.3	18	3 12 20.75	0.721	16 39 38.8	2.43	17 22.2
19	2 58 51.39	1.478	15 48 52.2	5.95	19 6.9	19	3 12 37.72	0.691	16 40 35.8	2.31	17 18.5
20	2 59 26.61	1.457	15 51 13.7	5.84	19 3.6	20	3 12 53.97	0.661	16 41 29.8	2.18	17 14.8
21	3 0 1.34	1.436	15 53 32.6	5.73	19 0.2	21	3 13 9.49	0.631	16 42 20.8	2.06	17 11.1
22	3 0 35.57	1.415	15 55 48.9	5.62	18 56.9	22	3 13 24.29	0.601	16 43 8.8	1.93	17 7.4
23	3 1 9.28	1.394	15 58 2.5	5.51	18 53.5	23	3 13 38.35	0.570	16 43 53.8	1.81	17 3.7
24	3 1 42.48	1.372	16 0 13.5	5.40	18 50.1	24	3 13 51.67	0.539	16 44 35.9	1.68	17 0.0
25	3 2 15.15	1.350	16 2 21.7	5.29	18 46.7	25	3 14 4.25	0.508	16 45 14.9	1.56	16 56.3
26	3 2 47.29	1.328	16 4 27.2	5.18	18 43.3	26	3 14 16.07	0.477	16 45 51.0	1.43	16 52.5
27	3 3 18.89	1.305	16 6 30.0	5.06	18 39.9	27	3 14 27.13	0.445	16 46 24.0	1.31	16 48.8
28	3 3 49.94	1.282	16 8 30.1	4.95	18 36.5	28	3 14 37.42	0.413	16 46 53.9	1.18	16 45.0
29	3 4 20.43	1.259	16 10 27.4	4.84	18 33.1	29	3 14 46.94	0.381	16 47 20.7	1.06	16 41.2
30	3 4 50.36	1.235	16 12 22.0	4.72	18 29.6	30	3 14 55.69	0.348	16 47 44.6	0.93	16 37.4
31	3 5 19.72	1.211	16 14 13.8	4.60	18 26.1	31	3 15 3.65	0.315	16 48 5.3	0.80	16 33.6
32	3 5 48.50	+1.186	+16 16 2.9	+4.48	18 22.6	32	3 15 10.82	+0.282	+16 48 23.0	+0.67	16 29.8
Day of the Month, 1st. 11th. 21st. 31st.						Day of the Month, 1st. 11th. 21st. 31st.					
Polar Semidiameter 17".0 17".4 17".9 18".4						Polar Semidiameter 18".5 19".1 19".7 20".3					
Horizontal Parallax 1.6 1.6 1.7 1.7						Horizontal Parallax 1.7 1.8 1.8 1.9					

## GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	3 15 10.82	+0.989	+16 48 23.0	+ 0.67	16 29.8	1	3 12 31.87	-0.711	+16 33 27.2	- 3.10	14 29.0
2	3 15 17.20	0.949	16 48 37.6	0.55	16 26.0	2	3 12 14.43	0.741	16 32 11.5	3.29	14 24.8
3	3 15 22.78	0.916	16 48 49.1	0.49	16 22.2	3	3 11 56.27	0.771	16 30 52.9	3.33	14 20.6
4	3 15 27.55	0.189	16 48 57.5	0.99	16 18.3	4	3 11 37.40	0.801	16 29 31.6	3.44	14 16.3
5	3 15 31.51	0.148	16 49 2.8	0.16	16 14.4	5	3 11 17.82	0.830	16 28 7.6	3.55	14 12.0
6	3 15 34.67	0.115	16 49 5.0	+ 0.03	16 10.5	6	3 10 57.55	0.858	16 26 41.0	3.66	14 7.7
7	3 15 37.01	0.081	16 49 4.0	- 0.10	16 6.6	7	3 10 36.61	0.886	16 25 11.8	3.77	14 3.4
8	3 15 38.54	0.047	16 49 0.0	0.93	16 2.7	8	3 10 15.01	0.914	16 23 40.1	3.87	13 59.1
9	3 15 39.25	+0.013	16 48 52.8	0.36	15 58.8	9	3 9 52.76	0.941	16 22 5.9	3.97	13 54.8
10	3 15 39.15	-0.091	16 48 42.5	0.49	15 54.9	10	3 9 29.88	0.967	16 20 29.3	4.07	13 50.5
11	3 15 38.24	0.055	16 48 29.1	0.69	15 50.9	11	3 9 6.38	0.992	16 18 50.2	4.17	13 46.2
12	3 15 36.52	0.088	16 48 12.6	0.75	15 46.9	12	3 8 42.29	1.017	16 17 8.8	4.27	13 41.9
13	3 15 33.98	0.122	16 47 53.1	0.88	15 42.9	13	3 8 17.61	1.041	16 15 25.2	4.36	13 37.6
14	3 15 30.63	0.156	16 47 30.5	1.01	15 38.9	14	3 7 52.38	1.064	16 13 39.4	4.45	13 33.2
15	3 15 26.48	0.190	16 47 4.8	1.14	15 34.9	15	3 7 26.60	1.086	16 11 51.4	4.54	13 28.8
16	3 15 21.52	0.223	16 46 36.1	1.27	15 30.9	16	3 7 0.30	1.108	16 10 1.4	4.62	13 24.4
17	3 15 15.75	0.257	16 46 4.3	1.39	15 26.9	17	3 6 33.49	1.129	16 8 9.4	4.70	13 20.0
18	3 15 9.17	0.291	16 45 29.5	1.52	15 22.8	18	3 6 6.18	1.149	16 6 15.5	4.78	13 15.6
19	3 15 1.79	0.325	16 44 51.7	1.64	15 18.8	19	3 5 38.40	1.168	16 4 19.7	4.86	13 11.2
20	3 14 53.61	0.358	16 44 10.8	1.77	15 14.7	20	3 5 10.16	1.186	16 2 22.1	4.93	13 6.8
21	3 14 44.62	0.391	16 43 27.0	1.89	15 10.6	21	3 4 41.49	1.203	16 0 22.8	5.00	13 2.4
22	3 14 34.84	0.424	16 42 40.2	2.02	15 6.5	22	3 4 12.40	1.220	15 58 21.8	5.07	12 58.0
23	3 14 24.27	0.457	16 41 50.4	2.14	15 2.4	23	3 3 42.92	1.236	15 56 19.2	5.14	12 53.6
24	3 14 12.92	0.490	16 40 57.7	2.23	14 58.3	24	3 3 13.06	1.251	15 54 15.1	5.20	12 49.2
25	3 14 0.79	0.522	16 40 2.0	2.38	14 54.1	25	3 2 42.85	1.265	15 52 9.6	5.26	12 44.8
26	3 13 47.88	0.554	16 39 3.5	2.50	14 49.9	26	3 2 12.31	1.278	15 50 2.7	5.31	12 40.3
27	3 13 34.20	0.586	16 38 2.0	2.62	14 45.8	27	3 1 41.45	1.290	15 47 54.6	5.36	12 35.9
28	3 13 19.75	0.618	16 36 57.6	2.74	14 41.6	28	3 1 10.31	1.302	15 45 45.3	5.40	12 31.5
29	3 13 4.54	0.649	16 35 50.3	2.86	14 37.4	29	3 0 38.91	1.313	15 23 35.0	5.44	12 27.0
30	3 12 48.58	0.680	16 34 40.2	2.98	14 33.2	30	3 0 7.27	1.323	15 41 23.7	5.48	12 22.5
31	3 12 31.87	0.711	16 33 27.2	3.10	14 29.0	31	2 59 35.41	1.332	15 39 11.5	5.52	12 18.0
32	3 12 14.43	-0.741	+16 32 11.5	- 3.22	14 24.8	32	2 59 3.36	-1.340	+15 36 58.6	- 5.55	12 13.5
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		20'.4	21'.0	21'.6	22'.2	Polar Semidiameter		22'.2	22'.7	23'.0	23'.2
Horizontal Parallax		1.9	1.9	2.0	2.1	Horizontal Parallax		2.1	2.1	2.1	2.1

## GREENWICH MEAN TIME.

NOVEMBER.						DECEMBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	2 59 3.36	-1.340	+15 36 58.6	-5.55	12 13.5	1	2 43 40.52	-1.079	+14 33 34.5	-4.34	10 0.3
2	2 58 31.16	1.347	15 34 45.0	5.58	12 9.1	2	2 43 14.90	1.056	14 31 51.5	4.23	9 55.9
3	2 57 58.82	1.352	15 32 30.8	5.60	12 4.7	3	2 42 49.84	1.032	14 30 11.2	4.12	9 51.6
4	2 57 26.38	1.355	15 30 16.1	5.62	12 0.2	4	2 42 25.36	1.008	14 28 33.5	4.01	9 47.3
5	2 56 53.86	1.358	15 28 1.1	5.63	11 55.7	5	2 42 1.48	0.983	14 26 58.6	3.90	9 43.0
6	2 56 21.27	1.360	15 25 45.9	5.64	11 51.2	6	2 41 38.21	0.957	14 25 26.6	3.78	9 38.7
7	2 55 48.65	1.361	15 23 30.5	5.64	11 46.8	7	2 41 15.56	0.930	14 23 57.6	3.66	9 34.4
8	2 55 16.02	1.360	15 21 15.1	5.64	11 42.3	8	2 40 53.56	0.903	14 22 31.5	3.53	9 30.1
9	2 54 43.41	1.358	15 18 59.8	5.63	11 37.8	9	2 40 32.22	0.875	14 21 8.5	3.40	9 25.8
10	2 54 10.85	1.355	15 16 44.8	5.62	11 33.3	10	2 40 11.55	0.847	14 19 48.8	3.26	9 21.5
11	2 53 38.36	1.351	15 14 30.1	5.60	11 28.8	11	2 39 51.56	0.818	14 18 32.3	3.12	9 17.3
12	2 53 5.98	1.346	15 12 15.9	5.58	11 24.3	12	2 39 32.26	0.789	14 17 19.1	2.98	9 13.0
13	2 52 33.72	1.340	15 10 2.3	5.56	11 19.8	13	2 39 13.67	0.760	14 16 9.2	2.84	9 8.8
14	2 52 1.61	1.333	15 7 49.3	5.53	11 15.3	14	2 38 55.79	0.730	14 15 2.8	2.69	9 4.6
15	2 51 29.67	1.326	15 5 37.1	5.49	11 10.9	15	2 38 38.63	0.700	14 13 59.8	2.55	9 0.4
16	2 50 57.93	1.318	15 3 25.8	5.45	11 6.5	16	2 38 22.20	0.669	14 13 0.3	2.40	8 56.2
17	2 50 26.40	1.309	15 1 15.5	5.41	11 2.0	17	2 38 6.51	0.638	14 12 4.4	2.26	8 52.0
18	2 49 55.11	1.299	14 59 6.3	5.36	10 57.5	18	2 37 51.57	0.607	14 11 12.0	2.11	8 47.8
19	2 49 24.09	1.287	14 56 58.3	5.30	10 53.1	19	2 37 37.38	0.575	14 10 23.2	1.96	8 43.6
20	2 48 53.36	1.274	14 54 51.7	5.24	10 48.7	20	2 37 23.95	0.543	14 9 38.1	1.80	8 39.4
21	2 48 22.94	1.260	14 52 46.5	5.18	10 44.3	21	2 37 11.30	0.511	14 8 56.7	1.65	8 35.3
22	2 47 52.86	1.246	14 50 42.8	5.12	10 39.8	22	2 36 59.42	0.479	14 8 18.9	1.49	8 31.2
23	2 47 23.13	1.231	14 48 40.7	5.05	10 35.4	23	2 36 48.33	0.446	14 7 44.8	1.34	8 27.1
24	2 46 53.77	1.215	14 46 40.4	4.98	10 31.0	24	2 36 38.02	0.413	14 7 14.6	1.18	8 23.0
25	2 46 24.81	1.198	14 44 41.8	4.90	10 26.6	25	2 36 28.50	0.380	14 6 48.2	1.02	8 18.9
26	2 45 56.27	1.180	14 42 45.2	4.82	10 22.2	26	2 36 19.78	0.347	14 6 25.6	0.86	8 14.9
27	2 45 28.16	1.161	14 40 50.6	4.73	10 17.8	27	2 36 11.86	0.313	14 6 6.8	0.70	8 10.8
28	2 45 0.51	1.142	14 38 58.1	4.64	10 13.4	28	2 36 4.75	0.279	14 5 51.9	0.54	8 6.8
29	2 44 33.34	1.122	14 37 7.9	4.54	10 9.0	29	2 35 58.45	0.245	14 5 40.8	0.38	8 2.7
30	2 44 6.67	1.101	14 35 20.0	4.44	10 4.6	30	2 35 52.96	0.211	14 5 33.6	0.22	7 58.7
31	2 43 40.52	1.079	14 33 34.5	4.34	10 0.3	31	2 35 48.29	0.177	14 5 30.3	-0.06	7 54.7
32	2 43 14.90	-1.056	+14 31 51.5	-4.23	9 55.9	32	2 35 44.44	-0.143	+14 5 30.9	+0.10	7 50.7
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		23'.2	23'.3	23'.1	22'.8	Polar Semidiameter		22'.8	22.3	21'.7	21'.0
Horizontal Parallax		2.1	2.1	2.1	2.1	Horizontal Parallax		2.1	2.0	2.0	1.9

## GREENWICH MEAN TIME.

JANUARY.						FEBRUARY.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	16 42 39.90	+1.150	20 40 30.9	-2.10	21 54.8	1	16 55 18.20	+0.856	21 0 41.6	-1.15	20 5.4
2	16 43 7.44	1.144	20 41 21.0	2.07	21 51.3	2	16 55 38.59	0.843	21 1 8.9	1.12	20 1.8
3	16 43 34.83	1.138	20 42 10.3	2.04	21 47.8	3	16 55 58.68	0.831	21 1 35.5	1.09	19 58.2
4	16 44 2.05	1.131	20 42 58.9	2.01	21 44.3	4	16 56 18.46	0.818	21 2 1.3	1.06	19 54.6
5	16 44 29.10	1.124	20 43 46.8	1.98	21 40.9	5	16 56 37.93	0.805	21 2 26.4	1.03	19 51.0
6	16 44 55.98	1.118	20 44 34.0	1.95	21 37.4	6	16 56 57.09	0.791	21 2 50.8	1.00	19 47.3
7	16 45 22.69	1.109	20 45 20.4	1.92	21 33.9	7	16 57 15.92	0.778	21 3 14.5	0.97	19 43.6
8	16 45 49.22	1.101	20 46 6.1	1.89	21 30.4	8	16 57 34.42	0.764	21 3 37.5	0.94	19 40.1
9	16 46 15.56	1.094	20 46 51.1	1.86	21 26.9	9	16 57 52.59	0.750	21 3 59.7	0.91	19 36.4
10	16 46 41.70	1.085	20 47 35.4	1.83	21 23.4	10	16 58 10.42	0.736	21 4 21.2	0.88	19 32.8
11	16 47 7.65	1.077	20 48 19.0	1.80	21 19.9	11	16 58 27.91	0.722	21 4 42.0	0.85	19 29.1
12	16 47 33.41	1.069	20 49 1.8	1.77	21 16.4	12	16 58 45.06	0.707	21 5 2.2	0.83	19 25.5
13	16 47 58.96	1.060	20 49 43.8	1.74	21 12.9	13	16 59 1.86	0.693	21 5 21.7	0.80	19 21.8
14	16 48 24.29	1.051	20 50 25.1	1.71	21 9.3	14	16 59 18.31	0.678	21 5 40.4	0.77	19 18.2
15	16 48 49.39	1.041	20 51 5.7	1.68	21 5.8	15	16 59 34.41	0.663	21 5 58.4	0.74	19 14.5
16	16 49 14.27	1.032	20 51 45.5	1.64	21 2.3	16	16 59 50.15	0.648	21 6 15.7	0.71	19 10.8
17	16 49 38.92	1.022	20 52 24.6	1.61	20 58.8	17	17 0 5.52	0.633	21 6 32.3	0.68	19 7.1
18	16 50 3.34	1.012	20 53 2.9	1.58	20 55.2	18	17 0 20.52	0.617	21 6 48.2	0.65	19 3.5
19	16 50 27.52	1.002	20 53 40.5	1.55	20 51.7	19	17 0 35.15	0.602	21 7 3.5	0.62	18 59.8
20	16 50 51.46	0.992	20 54 17.3	1.52	20 48.2	20	17 0 49.42	0.587	21 7 18.1	0.59	18 56.1
21	16 51 15.15	0.982	20 54 53.4	1.49	20 44.6	21	17 1 3.31	0.571	21 7 32.0	0.56	18 52.4
22	16 51 38.59	0.971	20 55 28.8	1.46	20 41.1	22	17 1 16.82	0.555	21 7 45.2	0.54	18 48.6
23	16 52 1.77	0.960	20 56 3.4	1.43	20 37.5	23	17 1 29.95	0.539	21 7 57.8	0.51	18 44.9
24	16 52 24.69	0.950	20 56 37.2	1.39	20 34.0	24	17 1 42.70	0.523	21 8 9.7	0.48	18 41.2
25	16 52 47.35	0.939	20 57 10.3	1.36	20 30.4	25	17 1 55.07	0.507	21 8 21.0	0.46	18 37.5
26	16 53 9.74	0.927	20 57 42.7	1.33	20 26.9	26	17 2 7.05	0.491	21 8 31.6	0.43	18 33.7
27	16 53 31.86	0.916	20 58 14.3	1.30	20 23.3	27	17 2 18.64	0.475	21 8 41.5	0.40	18 30.0
28	16 53 53.70	0.904	20 58 45.2	1.27	20 19.7	28	17 2 29.83	0.458	21 8 50.8	0.38	18 26.2
29	16 54 15.26	0.892	20 59 15.4	1.24	20 16.1	29	17 2 40.63	0.442	21 8 59.5	0.35	18 22.5
30	16 54 36.53	0.880	20 59 44.9	1.21	20 12.6	30	17 2 51.03	0.425	21 9 7.6	0.33	18 18.7
31	16 54 57.51	0.868	21 0 13.6	1.18	20 9.0	31	17 3 1.03	0.408	21 9 15.1	0.30	18 14.9
32	16 55 18.20	+0.856	21 0 41.6	-1.15	20 5.4	32	17 3 10.62	+0.391	21 9 22.0	-0.27	18 11.1
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		7.2	7.3	7.3	7.4	Polar Semidiameter		7.4	7.5	7.7	7.8
Horizontal Parallax		0.8	0.8	0.8	0.8	Horizontal Parallax		0.8	0.8	0.8	0.9

## GREENWICH MEAN TIME.

MARCH.						APRIL.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	17 2 40.63	+0.442	21 8 59.5	-0.35	18 22.5	1	17 4 48.16	-0.103	21 8 34.1	+0.39	16 22.5
2	17 2 51.03	0.425	21 9 7.6	0.33	18 18.7	2	17 4 45.48	0.120	21 8 24.5	0.41	16 18.6
3	17 3 1.03	0.408	21 9 15.1	0.30	18 14.9	3	17 4 42.38	0.138	21 8 14.4	0.43	16 14.6
4	17 3 10.62	0.391	21 9 22.0	0.27	18 11.1	4	17 4 38.86	0.155	21 8 3.8	0.45	16 10.6
5	17 3 19.80	0.374	21 9 28.2	0.24	18 7.4	5	17 4 34.93	0.172	21 7 52.8	0.47	16 6.6
6	17 3 28.58	0.357	21 9 33.7	0.21	18 3.6	6	17 4 30.59	0.190	21 7 41.3	0.49	16 2.6
7	17 3 36.95	0.340	21 9 38.6	0.19	17 59.8	7	17 4 25.83	0.207	21 7 29.3	0.51	15 58.6
8	17 3 44.90	0.322	21 9 42.9	0.17	17 56.0	8	17 4 20.66	0.224	21 7 16.8	0.53	15 54.5
9	17 3 52.43	0.305	21 9 46.7	0.15	17 52.1	9	17 4 15.08	0.241	21 7 3.8	0.55	15 50.5
10	17 3 59.54	0.287	21 9 49.9	0.12	17 48.3	10	17 4 9.10	0.258	21 6 50.3	0.57	15 46.5
11	17 4 6.23	0.270	21 9 52.4	0.09	17 44.5	11	17 4 2.72	0.274	21 6 36.4	0.59	15 42.4
12	17 4 12.49	0.252	21 9 54.3	0.07	17 40.7	12	17 3 55.94	0.291	21 6 22.0	0.61	15 38.4
13	17 4 18.33	0.234	21 9 55.6	0.04	17 36.8	13	17 3 48.76	0.307	21 6 7.1	0.63	15 34.3
14	17 4 23.74	0.217	21 9 56.3	-0.02	17 33.0	14	17 3 41.19	0.323	21 5 51.8	0.65	15 30.3
15	17 4 28.73	0.199	21 9 56.5	+0.01	17 29.1	15	17 3 33.24	0.339	21 5 36.1	0.66	15 26.2
16	17 4 33.29	0.181	21 9 56.1	0.03	17 25.3	16	17 3 24.90	0.355	21 5 19.9	0.68	15 22.1
17	17 4 37.42	0.163	21 9 55.1	0.05	17 21.4	17	17 3 16.18	0.371	21 5 3.3	0.70	15 18.0
18	17 4 41.12	0.145	21 9 53.5	0.08	17 17.5	18	17 3 7.09	0.386	21 4 46.3	0.72	15 14.0
19	17 4 44.39	0.127	21 9 51.3	0.10	17 13.7	19	17 2 57.64	0.401	21 4 28.8	0.74	15 9.9
20	17 4 47.23	0.110	21 9 48.6	0.13	17 9.8	20	17 2 47.83	0.416	21 4 10.9	0.75	15 5.8
21	17 4 49.65	0.092	21 9 45.3	0.15	17 5.9	21	17 2 37.65	0.431	21 3 52.6	0.77	15 1.7
22	17 4 51.64	0.074	21 9 41.5	0.17	17 2.0	22	17 2 27.12	0.446	21 3 33.9	0.79	14 57.6
23	17 4 53.21	0.056	21 9 37.2	0.19	16 58.1	23	17 2 16.24	0.460	21 3 14.8	0.80	14 53.5
24	17 4 54.35	0.039	21 9 32.3	0.21	16 54.1	24	17 2 5.02	0.474	21 2 55.3	0.82	14 49.3
25	17 4 55.06	0.021	21 9 26.8	0.24	16 50.2	25	17 1 53.47	0.488	21 2 35.5	0.83	14 45.2
26	17 4 55.35	+0.003	21 9 20.8	0.26	16 46.3	26	17 1 41.59	0.502	21 2 15.3	0.85	14 41.1
27	17 4 55.21	-0.015	21 9 14.3	0.28	16 42.3	27	17 1 29.38	0.515	21 1 54.7	0.86	14 36.9
28	17 4 54.64	0.032	21 9 7.3	0.30	16 38.4	28	17 1 16.85	0.528	21 1 33.8	0.88	14 32.8
29	17 4 53.65	0.050	21 8 59.8	0.32	16 34.4	29	17 1 4.01	0.541	21 1 12.5	0.90	14 28.6
30	17 4 52.24	0.067	21 8 51.8	0.35	16 30.5	30	17 0 50.86	0.554	21 0 50.8	0.91	14 24.5
31	17 4 50.41	0.085	21 8 43.2	0.37	16 26.5	31	17 0 37.40	0.567	21 0 28.8	0.93	14 20.3
32	17 4 48.16	-0.103	21 8 34.1	+0.39	16 22.5	32	17 0 23.64	-0.579	21 0 6.4	+0.94	14 16.2
Day of the Month, 1st. 11th. 21st. 31st.						Day of the Month, 1st. 11th. 21st. 31st.					
Polar Semidiameter 7.8 7.9 8.0 8.2						Polar Semidiameter 8.2 8.3 8.4 8.5					
Horizontal Parallax 0.9 0.9 0.9 0.9						Horizontal Parallax 0.9 0.9 0.9 0.9					

## GREENWICH MEAN TIME.

MAY.						JUNE.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"			h m s	s	° ' "	"	
1	17 0 37.40	-0.567	21 0 28.8	+ 0.93	14 20.3	1	16 51 52.27	-0.787	20 47 6.7	+ 1.15	12 9.7
2	17 0 23.64	0.579	21 0 6.4	0.94	14 16.2	2	16 51 33.37	0.788	20 46 39.0	1.15	12 5.4
3	17 0 9.60	0.591	20 59 43.7	0.95	14 12.0	3	16 51 14.46	0.788	20 46 11.4	1.15	12 1.2
4	16 59 55.28	0.602	20 59 20.7	0.96	14 7.8	4	16 50 55.54	0.789	20 45 43.8	1.15	11 56.9
5	16 59 40.69	0.614	20 58 57.4	0.98	14 3.6	5	16 50 36.61	0.789	20 45 16.2	1.15	11 52.7
6	16 59 25.82	0.625	20 58 33.8	0.99	13 59.5	6	16 50 17.68	0.788	20 44 48.7	1.14	11 48.4
7	16 59 10.68	0.636	20 58 9.9	1.00	13 55.3	7	16 49 58.77	0.787	20 44 21.3	1.14	11 44.2
8	16 58 55.29	0.646	20 57 45.7	1.01	13 51.1	8	16 49 39.89	0.786	20 43 54.0	1.13	11 40.0
9	16 58 39.66	0.656	20 57 21.2	1.03	13 46.9	9	16 49 21.05	0.784	20 43 26.9	1.13	11 35.7
10	16 58 23.79	0.666	20 56 56.4	1.04	13 42.7	10	16 49 2.26	0.782	20 42 59.9	1.12	11 31.5
11	16 58 7.69	0.676	20 56 31.3	1.05	13 38.5	11	16 48 43.52	0.779	20 42 33.1	1.11	11 27.2
12	16 57 51.36	0.685	20 56 6.0	1.06	13 34.3	12	16 48 24.85	0.776	20 42 6.4	1.11	11 23.0
13	16 57 34.82	0.693	20 55 40.5	1.07	13 30.1	13	16 48 6.26	0.773	20 41 39.9	1.10	11 18.8
14	16 57 18.08	0.701	20 55 14.8	1.08	13 25.9	14	16 47 47.76	0.769	20 41 13.7	1.09	11 14.5
15	16 57 1.15	0.709	20 54 48.9	1.09	13 21.7	15	16 47 29.35	0.765	20 40 47.7	1.08	11 10.3
16	16 56 44.04	0.717	20 54 22.7	1.10	13 17.5	16	16 47 11.04	0.760	20 40 21.9	1.07	11 6.1
17	16 56 26.75	0.724	20 53 56.3	1.10	13 13.2	17	16 46 52.85	0.755	20 39 56.4	1.06	11 1.8
18	16 56 9.29	0.731	20 53 29.7	1.11	13 9.0	18	16 46 34.79	0.750	20 39 31.2	1.04	10 57.6
19	16 55 51.67	0.737	20 53 3.0	1.11	13 4.8	19	16 46 16.86	0.744	20 39 6.3	1.03	10 53.4
20	16 55 33.90	0.743	20 52 36.2	1.12	13 0.5	20	16 45 59.07	0.738	20 38 41.8	1.01	10 49.1
21	16 55 15.99	0.749	20 52 9.3	1.12	12 56.3	21	16 45 41.42	0.732	20 38 17.6	1.00	10 44.9
22	16 54 57.94	0.755	20 51 42.3	1.13	12 52.1	22	16 45 23.93	0.725	20 37 53.7	0.99	10 40.7
23	16 54 39.76	0.760	20 51 15.1	1.14	12 47.8	23	16 45 6.61	0.718	20 37 30.2	0.97	10 36.5
24	16 54 21.47	0.764	20 50 47.8	1.14	12 43.6	24	16 44 49.47	0.710	20 37 7.1	0.95	10 32.3
25	16 54 3.09	0.768	20 50 20.4	1.15	12 39.4	25	16 44 32.51	0.703	20 36 44.4	0.94	10 28.0
26	16 53 44.63	0.771	20 49 52.8	1.15	12 35.1	26	16 44 15.73	0.695	20 36 22.0	0.92	10 23.8
27	16 53 26.08	0.775	20 49 25.1	1.15	12 30.9	27	16 43 59.15	0.686	20 36 0.0	0.91	10 19.6
28	16 53 7.44	0.778	20 48 57.4	1.15	12 26.6	28	16 43 42.78	0.678	20 35 38.5	0.89	10 15.4
29	16 52 48.73	0.781	20 48 29.7	1.15	12 22.4	29	16 43 26.62	0.669	20 35 17.5	0.86	10 11.2
30	16 52 29.96	0.783	20 48 2.0	1.15	12 18.2	30	16 43 10.68	0.660	20 34 57.0	0.84	10 7.0
31	16 52 11.14	0.785	20 47 34.3	1.15	12 13.9	31	16 42 54.96	0.650	20 34 37.0	0.82	10 2.6
32	16 51 52.27	-0.787	20 47 6.7	+ 1.15	12 9.7	32	16 42 39.47	-0.640	20 34 17.5	+ 0.80	9 58.7
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		8.5	8.6	8.6	8.7	Polar Semidiameter		8.7	8.7	8.6	8.6
Horizontal Parallax		0.9	0.9	0.9	1.0	Horizontal Parallax		1.0	1.0	0.9	0.9



## GREENWICH MEAN TIME.

JULY.						AUGUST.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m
1	16 42 54.96	-0.650	20 34 37.0	+0.82	10 2.8	1	16 37 16.33	-0.228	20 29 31.1	-0.07	7 55.4
2	16 42 39.47	0.640	20 34 17.5	0.80	9 58.7	2	16 37 11.07	0.211	20 29 33.2	0.11	7 51.4
3	16 42 24.23	0.630	20 33 58.5	0.78	9 54.5	3	16 37 6.20	0.195	20 29 36.2	0.14	7 47.4
4	16 42 9.25	0.619	20 33 40.0	0.76	9 50.3	4	16 37 1.72	0.178	20 29 40.0	0.18	7 43.4
5	16 41 54.52	0.608	20 33 22.0	0.74	9 46.1	5	16 36 57.64	0.162	20 29 44.7	0.21	7 39.4
6	16 41 40.05	0.597	20 33 4.6	0.71	9 42.0	6	16 36 53.96	0.145	20 29 50.2	0.25	7 35.4
7	16 41 25.85	0.586	20 32 47.8	0.69	9 37.8	7	16 36 50.68	0.128	20 29 56.5	0.28	7 31.4
8	16 41 11.94	0.574	20 32 31.5	0.67	9 33.6	8	16 36 47.81	0.111	20 30 3.7	0.32	7 27.4
9	16 40 58.32	0.561	20 32 15.8	0.64	9 29.5	9	16 36 45.35	0.094	20 30 11.7	0.35	7 23.5
10	16 40 44.99	0.549	20 32 0.8	0.61	9 25.3	10	16 36 43.30	0.077	20 30 20.5	0.38	7 19.5
11	16 40 31.95	0.537	20 31 46.5	0.58	9 21.2	11	16 36 41.66	0.060	20 30 30.1	0.42	7 15.5
12	16 40 19.22	0.524	20 31 32.8	0.56	9 17.0	12	16 36 40.43	0.043	20 30 40.6	0.46	7 11.6
13	16 40 6.80	0.511	20 31 19.8	0.53	9 12.9	13	16 36 39.61	0.026	20 30 52.0	0.49	7 7.6
14	16 39 54.70	0.497	20 31 7.4	0.50	9 8.8	14	16 36 39.20	-0.009	20 31 4.2	0.53	7 3.7
15	16 39 42.93	0.484	20 30 55.7	0.47	9 4.6	15	16 36 39.20	+0.009	20 31 17.3	0.56	6 59.8
16	16 39 31.49	0.470	20 30 44.7	0.44	9 0.5	16	16 36 39.61	0.026	20 31 31.2	0.60	6 55.9
17	16 39 20.38	0.456	20 30 34.5	0.41	8 56.4	17	16 36 40.43	0.043	20 31 45.9	0.63	6 51.9
18	16 39 9.60	0.442	20 30 25.0	0.38	8 52.3	18	16 36 41.66	0.060	20 32 1.5	0.67	6 48.0
19	16 38 59.16	0.428	20 30 16.2	0.35	8 48.2	19	16 36 43.30	0.077	20 32 17.9	0.70	6 44.1
20	16 38 49.07	0.413	20 30 8.1	0.32	8 44.1	20	16 36 45.36	0.094	20 32 35.1	0.73	6 40.2
21	16 38 39.33	0.399	20 30 0.7	0.29	8 40.0	21	16 36 47.83	0.111	20 32 53.1	0.77	6 36.3
22	16 38 29.94	0.384	20 29 54.1	0.26	8 35.9	22	16 36 50.70	0.128	20 33 11.9	0.80	6 32.5
23	16 38 20.91	0.369	20 29 48.3	0.22	8 31.8	23	16 36 53.98	0.145	20 33 31.5	0.84	6 28.6
24	16 38 12.25	0.353	20 29 43.3	0.19	8 27.8	24	16 36 57.67	0.162	20 33 52.0	0.87	6 24.7
25	16 38 3.95	0.338	20 29 39.0	0.16	8 23.7	25	16 37 1.77	0.179	20 34 13.3	0.90	6 20.8
26	16 37 56.02	0.323	20 29 35.5	0.13	8 19.6	26	16 37 6.28	0.196	20 34 35.3	0.93	6 17.0
27	16 37 48.46	0.307	20 29 32.8	0.10	8 15.6	27	16 37 11.19	0.213	20 34 58.1	0.96	6 13.1
28	16 37 41.28	0.291	20 29 30.9	0.06	8 11.5	28	16 37 16.51	0.230	20 35 21.6	1.00	6 9.3
29	16 37 34.47	0.276	20 29 29.8	+0.03	8 7.5	29	16 37 22.24	0.247	20 35 45.9	1.03	6 5.5
30	16 37 28.04	0.260	20 29 29.5	0.00	8 3.5	30	16 37 28.37	0.264	20 36 11.0	1.06	6 1.6
31	16 37 21.99	0.244	20 29 29.9	-0.03	7 59.4	31	16 37 34.90	0.281	20 36 36.9	1.09	5 57.8
32	16 37 16.33	-0.228	20 29 31.1	-0.07	7 55.4	32	16 37 41.84	+0.298	20 37 3.5	-1.12	5 54.0
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		8.6	8.5	8.4	8.3	Polar Semidiameter		8.3	8.1	8.0	7.9
Horizontal Parallax		0.9	0.9	0.9	0.9	Horizontal Parallax		0.9	0.9	0.9	0.9

## GREENWICH MEAN TIME.

SEPTEMBER.						OCTOBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
	Noon.	Noon.	Noon.	Noon.			Noon.	Noon.	Noon.	Noon.	
1	h m s	"	° ' "	"	h m	1	h m s	"	° ' "	"	h m
1	16 37 41.84	+0.298	20 37 3.5	-1.19	5 54.0	1	16 44 7.46	+0.756	20 55 17.1	-1.84	4 2.5
2	16 37 49.18	0.314	20 37 30.8	1.15	5 50.2	2	16 44 25.78	0.770	20 56 1.3	1.85	3 58.8
3	16 37 56.92	0.331	20 37 58.8	1.18	5 46.4	3	16 44 44.43	0.784	20 56 45.9	1.87	3 55.2
4	16 38 5.06	0.347	20 38 27.6	1.21	5 42.6	4	16 45 3.40	0.797	20 57 30.9	1.88	3 51.6
5	16 38 13.60	0.364	20 38 57.1	1.24	5 38.8	5	16 45 22.68	0.810	20 58 16.2	1.89	3 48.0
6	16 38 22.54	0.381	20 39 27.3	1.27	5 35.0	6	16 45 42.27	0.823	20 59 1.8	1.91	3 44.4
7	16 38 31.87	0.397	20 39 58.2	1.30	5 31.3	7	16 46 2.16	0.835	20 59 47.7	1.92	3 40.8
8	16 38 41.59	0.413	20 40 29.8	1.33	5 27.5	8	16 46 22.36	0.848	21 0 33.9	1.93	3 37.2
9	16 38 51.70	0.429	20 41 2.1	1.36	5 23.7	9	16 46 42.86	0.860	21 1 20.4	1.94	3 33.6
10	16 39 2.20	0.446	20 41 35.0	1.39	5 20.0	10	16 47 3.66	0.873	21 2 7.2	1.95	3 30.0
11	16 39 13.09	0.462	20 42 8.6	1.41	5 16.2	11	16 47 24.75	0.885	21 2 54.2	1.96	3 26.5
12	16 39 24.37	0.478	20 42 42.8	1.44	5 12.5	12	16 47 46.12	0.896	21 3 41.4	1.97	3 22.9
13	16 39 36.03	0.494	20 43 17.7	1.47	5 8.7	13	16 48 7.77	0.908	21 4 28.8	1.98	3 19.3
14	16 39 48.07	0.509	20 43 53.2	1.49	5 5.0	14	16 48 29.70	0.919	21 5 16.3	1.98	3 15.7
15	16 40 0.48	0.525	20 44 29.3	1.51	5 1.3	15	16 48 51.90	0.931	21 6 4.0	1.99	3 12.2
16	16 40 13.26	0.540	20 45 5.9	1.54	4 57.6	16	16 49 14.37	0.942	21 6 51.9	2.00	3 8.6
17	16 40 26.40	0.555	20 45 43.1	1.56	4 53.9	17	16 49 37.10	0.953	21 7 40.0	2.01	3 5.1
18	16 40 39.91	0.570	20 46 20.9	1.59	4 50.1	18	16 50 0.09	0.963	21 8 28.3	2.01	3 1.5
19	16 40 53.78	0.585	20 46 59.2	1.61	4 46.4	19	16 50 23.34	0.974	21 9 16.7	2.02	2 58.0
20	16 41 8.01	0.600	20 47 38.1	1.63	4 42.7	20	16 50 46.84	0.984	21 10 5.2	2.02	2 54.4
21	16 41 22.59	0.615	20 48 17.5	1.65	4 39.0	21	16 51 10.59	0.995	21 10 53.8	2.02	2 50.9
22	16 41 37.53	0.630	20 48 57.4	1.67	4 35.4	22	16 51 34.58	1.005	21 11 42.4	2.02	2 47.4
23	16 41 52.83	0.645	20 49 37.8	1.69	4 31.7	23	16 51 58.81	1.015	21 12 31.0	2.03	2 43.8
24	16 42 8.48	0.659	20 50 18.6	1.71	4 28.0	24	16 52 23.28	1.024	21 13 19.6	2.03	2 40.3
25	16 42 24.47	0.673	20 50 59.9	1.73	4 24.4	25	16 52 47.98	1.034	21 14 8.3	2.03	2 36.8
26	16 42 40.80	0.687	20 51 41.7	1.75	4 20.7	26	16 53 12.91	1.044	21 14 57.0	2.03	2 33.3
27	16 42 57.46	0.701	20 52 23.9	1.77	4 17.0	27	16 53 38.07	1.053	21 15 45.7	2.03	2 29.7
28	16 43 14.46	0.715	20 53 6.6	1.79	4 13.4	28	16 54 3.45	1.062	21 16 34.5	2.03	2 26.2
29	16 43 31.80	0.729	20 53 49.7	1.81	4 9.7	29	16 54 29.05	1.071	21 17 23.3	2.03	2 22.7
30	16 43 49.47	0.743	20 54 33.2	1.82	4 6.1	30	16 54 54.86	1.080	21 18 12.0	2.03	2 19.2
31	16 44 7.46	0.756	20 55 17.1	1.84	4 2.5	31	16 55 20.87	1.088	21 19 0.7	2.03	2 15.7
32	16 44 25.78	+0.770	20 56 1.3	-1.85	3 58.8	32	16 55 47.09	+1.097	21 19 49.3	-2.02	2 12.2
Day of the Month,						Day of the Month,					
		1st.	11th.	21st.	31st.			1st.	11th.	21st.	31st.
Polar Semidiameter		7".8	7".7	7".6	7".5	Polar Semidiameter		7".5	7".4	7".3	7".2
Horizontal Parallax		0.9	0.8	0.8	0.8	Horizontal Parallax		0.8	0.8	0.8	0.8

## GREENWICH MEAN TIME.

NOVEMBER.						DECEMBER.					
Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.	Day of Month.	Apparent Right Ascension.	Var. of R. A. for 1 Hour.	Apparent Declination.	Var. of Dec. for 1 Hour.	Meridian Passage.
Noon.	Noon.	Noon.	Noon.	Noon.		Noon.	Noon.	Noon.	Noon.		
h m s	s	° ' "	"	h m		h m s	s	° ' "	"	h m	
1 16 55 47.09	+1.097	-21 19 49.3	-2.02	2 12.2		1 17 10 5.06	1.257	-21 42 36.2	-1.70	0 28.5	
2 16 56 13.52	1.105	21 20 37.8	2.02	2 8.7		2 17 10 35.25	1.259	21 43 16.9	1.69	0 25.1	
3 16 56 40.15	1.113	21 21 26.3	2.02	2 5.2		3 17 11 5.50	1.261	21 43 57.3	1.67	0 21.6	
4 16 57 6.96	1.121	21 22 14.7	2.01	2 1.7		4 17 11 35.80	1.263	21 44 37.3	1.66	0 18.2	
5 16 57 33.95	1.128	21 23 3.0	2.01	1 58.3		5 17 12 6.14	1.265	21 45 16.8	1.64	0 14.8	
6 16 58 1.12	1.136	21 23 51.1	2.00	1 54.8		6 17 12 36.51	1.266	21 45 55.8	1.62	0 11.3	
7 16 58 28.47	1.143	21 24 39.0	1.99	1 51.3		7 17 13 6.91	1.267	21 46 34.4	1.60	0 7.9	
8 16 58 56.00	1.150	21 25 26.8	1.99	1 47.8		8 17 13 37.34	1.268	21 47 12.5	1.58	0 4.5	
9 16 59 23.69	1.157	21 26 14.4	1.98	1 44.4		9 17 14 7.79	1.269	21 47 50.1	1.56	0 1.0	
10 16 59 51.53	1.163	21 27 1.8	1.97	1 40.9		10 17 14 38.25	1.269	21 48 27.3	1.54	23 54.2	
11 17 0 19.53	1.170	21 27 49.0	1.96	1 37.4		11 17 15 8.72	1.270	21 49 4.1	1.52	23 50.8	
12 17 0 47.69	1.176	21 28 36.1	1.96	1 34.0		12 17 15 39.19	1.270	21 49 40.4	1.50	23 47.3	
13 17 1 16.00	1.182	21 29 23.0	1.95	1 30.5		13 17 16 9.66	1.270	21 50 16.2	1.48	23 43.9	
14 17 1 44.45	1.188	21 30 9.6	1.94	1 27.0		14 17 16 40.13	1.269	21 50 51.6	1.46	23 40.5	
15 17 2 13.03	1.193	21 30 56.0	1.93	1 23.6		15 17 17 10.59	1.269	21 51 26.5	1.44	23 37.1	
16 17 2 41.73	1.199	21 31 42.1	1.91	1 20.1		16 17 17 41.03	1.268	21 52 0.9	1.42	23 33.6	
17 17 3 10.56	1.204	21 32 27.9	1.90	1 16.7		17 17 18 11.45	1.267	21 52 34.8	1.40	23 30.2	
18 17 3 39.51	1.209	21 33 13.4	1.89	1 13.2		18 17 18 41.84	1.266	21 53 8.2	1.38	23 26.8	
19 17 4 8.58	1.214	21 33 58.7	1.88	1 9.8		19 17 19 12.20	1.264	21 53 41.1	1.36	23 23.4	
20 17 4 37.77	1.219	21 34 43.7	1.87	1 6.3		20 17 19 42.53	1.263	21 54 13.4	1.34	23 19.9	
21 17 5 7.07	1.223	21 35 28.4	1.85	1 2.9		21 17 20 12.82	1.261	21 54 45.2	1.31	23 16.5	
22 17 5 36.47	1.227	21 36 12.7	1.84	0 59.4		22 17 20 43.07	1.259	21 55 16.5	1.29	23 13.1	
23 17 6 5.97	1.231	21 36 56.7	1.83	0 56.0		23 17 21 13.27	1.257	21 55 47.3	1.27	23 9.6	
24 17 6 35.57	1.235	21 37 40.4	1.81	0 52.5		24 17 21 43.42	1.255	21 56 17.6	1.25	23 6.2	
25 17 7 5.26	1.239	21 38 23.8	1.80	0 49.1		25 17 22 13.51	1.252	21 56 47.4	1.23	23 2.8	
26 17 7 35.03	1.242	21 39 6.8	1.78	0 45.7		26 17 22 43.54	1.250	21 57 16.6	1.21	22 59.3	
27 17 8 4.89	1.246	21 39 49.4	1.77	0 42.2		27 17 23 13.50	1.247	21 57 45.3	1.19	22 55.9	
28 17 8 34.83	1.249	21 40 31.7	1.75	0 38.8		28 17 23 43.39	1.244	21 58 13.5	1.16	22 52.5	
29 17 9 4.84	1.252	21 41 13.6	1.74	0 35.4		29 17 24 13.20	1.240	21 58 41.2	1.14	22 49.0	
30 17 9 34.92	1.255	21 41 55.1	1.72	0 31.9		30 17 24 42.92	1.236	21 59 8.4	1.12	22 45.6	
31 17 10 5.06	1.257	21 42 36.2	1.70	0 28.5		31 17 25 12.55	1.233	21 59 35.1	1.10	22 42.2	
32 17 10 35.25	+1.259	-21 43 16.9	-1.69	0 25.1		32 17 25 42.09	1.229	-22 0 1.2	-1.08	22 38.7	
Day of the Month, 1st. 11th. 21st. 31st.						Day of the Month, 1st. 11th. 21st. 31st.					
Polar Semidiameter 7.2 7.2 7.1 7.1						Polar Semidiameter 7.1 7.1 7.1 7.1					
Horizontal Parallax 0.8 0.8 0.8 0.8						Horizontal Parallax 0.8 0.8 0.8 0.8					

# 242 SUN'S COÖRDINATES, 1869.

Greenwich Mean Noon.		X.	Y.	Z.	Greenwich Mean Noon.		X.	Y.	Z.		
Jan.	1	d	+1908757	—8848278	—3838929	Mar.	1	d	+9373753	—9630309	—1285551
	2	1	2080023	8815827	3824843		2	61	9431237	2812942	1220425
	3	2	2250656	8781636	3800570		3	62	9485873	2661981	1154926
	4	3	2420605	8742711	3793112		4	63	9537644	2510200	1089074
	5	4	2589817	8702063	3775474		5	64	9586533	2357645	1022889
	6	5					6	65	+9632525	—2204363	—0956389
	7	6	+2758240	—8658702	—3756660		7	66	9675606	2050399	0889593
	8	7	2925817	8612640	3736675		8	67	9715761	1895800	0822524
	9	8	3092495	8563889	3715525		9	68	9752977	1740614	0755202
	10	9	3258222	8512463	3693216		10	69	9787241	1584893	0687646
	11	10	3422943	8458376	3669754						
	12	11	+3586602	—9401643	—3645145		11	70	+9818544	—1428686	—0619877
	13	12	3749145	8342230	3619395		12	71	9846876	1272043	0551919
	14	13	3910516	8290305	3592513		13	72	9872228	1115012	0483793
	15	14	4070662	8215740	3564509		14	73	9894595	0957642	0415520
	16	15	4229533	8148611	3535394		15	74	9913974	0799985	0347122
	17	16					16	75	+9930361	—0642094	—0278621
	18	17	+4387078	—8078943	—3505177		17	76	9943757	0484021	0210039
	19	18	4543244	8006759	3473867		18	77	9954163	0325816	0141307
	20	19	4697982	7932086	3441476		19	78	9961579	0167528	0072717
21	20	4851244	7854950	3408015	20	79	9966008	—0009206	—0004021		
22	21	5002984	7775382	3373495							
23	22	+5153156	—7693409	—3337930	21	80	+9967457	+0149104	+0064670		
24	23	5301717	7609061	3301334	22	81	9965934	0307354	0133326		
25	24	5448625	7522366	3263720	23	82	9961444	0465498	0201957		
26	25	5593839	7433354	3225099	24	83	9953995	0623491	0270514		
27	26	5737318	7342052	3185484	25	84	9943593	0781289	0338986		
28	27				26	85	+9930246	+0938850	+0407352		
29	28	+5879020	—7248489	—3144886	27	86	9913960	1096129	0475595		
30	29	6018905	7152693	3103318	28	87	9894744	1253083	0543697		
31	30	6156934	7054696	3060794	29	88	9872606	1409669	0611637		
32	31	6293071	6954527	3017327	30	89	9847555	1565845	0679397		
33	32	6427274	6852212	2972931							
Feb.	1	31	+6550503	—6747781	—2927618	31	90	+9819598	+1721567	+0746961	
	2	32	6689722	6641265	2881401	32	91	9788742	1876790	0814309	
	3	33	6817894	6532695	2834293	33	92	9754994	2031471	0881420	
	4	34	6943975	6422101	2786308	34	93	9718365	2185569	0948276	
	5	35	7067923	6309516	2737461	35	94	9678864	2339038	1014857	
	6	36	+7189701	—6194971	—2687765	36	95	+9636502	+2491833	+1081143	
	7	37	7309269	6078504	2637234	37	96	9591201	2643908	1147115	
	8	38	7426589	5960147	2585889	38	97	9543245	2795215	1212753	
	9	39	7541622	5839938	2533741	39	98	9492377	2945707	1278037	
	10	40	7654330	5717916	2480807	40	99	9438701	3095337	1342949	
	11	41	+7764677	—5594120	—2427104	41	100	+9382235	+3244057	+1407469	
	12	42	7872626	5468592	2372650	42	101	9322998	3391822	1471577	
	13	43	7978142	5341375	2317464	43	102	9261010	3538588	1535253	
	14	44	8081192	5212512	2261563	44	103	9196292	3684309	1598477	
	15	45	8181745	5082047	2204965	45	104	9128868	3828939	1661228	
	16	46				46	105				
	17	47	+8279772	—4950024	—2147690	47	106	+9058765	+3972435	+1723488	
	18	48	8375246	4816488	2089757	48	107	8986011	4114753	1785240	
	19	49	8468139	4681484	2031185	49	108	8910632	4255853	1846464	
	20	50	8558424	4545058	1971995	50	109	8832654	4395615	1907142	
21	51	8646081	4407255	1912205	51	110	8752106	4534241	1967260		
22	52				52	111					
23	53	+8731090	—4268118	—1851833	53	112	+8669017	+4671454	+2026800		
24	54	8813429	4127691	1790900	54	113	8583417	4807277	2085747		
25	55	8893075	3966018	1729426	55	114	8495334	4941735	2144079		
26	56	8970010	3843143	1667430	56	115	8404795	5074733	2201789		
27	57	9044219	3699108	1604933	57	116	8311830	5206259	2258850		
28	58				58	117					
29	59	+9115633	—3533957	—1541952	59	118	+8216468	+5336278	+2315273		
30	60	9184386	3407732	1478504	60	119	8118735	5464757	2371017		
31	61	9250310	3260476	1414608	61	120	8014662	5591663	2426076		
32	62	9313438	3112231	1350284	62	121	7916277	5716860	2480436		
33	63	9373739	2963039	1285551	63	122	7811611	5840615	2534083		
34	64				64	123					
35	65	+9431237	—2812942	—1220425	65	124	+7704694	+5962597	+2587002		
36	66	9485873	—2661981	—1154926	66	125	+7595553	+6082873	+2639179		

# SUN'S COÖRDINATES, 1869. 243

Greenwich Mean Noon.				X.	Y.	Z.	Greenwich Mean Noon.				X.	Y.	Z.
May	1	121	d	+7595553	+6082873	+2639179	July	1	182	d	-1698118	+9196564	+3990066
	2	122		7484213	.6201407	.2690600		2	183		.1864689	.9169464	.3978306
	3	123		.7370703	.6318163	.2741250		3	184		.2030750	.9139778	.3965425
	4	124		.7255059	.6433109	.2791115		4	185		.2196251	.9107509	.3951426
	5	125		.7137314	.6546213	.2840180		5	186		.2361145	.9072666	.3936309
	6	126		+7017500	+6657440	+2888431		6	187		-2525380	+9035253	+3920080
	7	127		.6895653	.6766755	.2935854		7	188		.2688908	.8995281	.3902743
	8	128		.6771808	.6874123	.2982434		8	189		.2851681	.8952762	.3884302
	9	129		.6646402	.679510	.3028156		9	190		.3013648	.8907707	.3864762
	10	130		.6518273	.7082885	.3073006		10	191		.3174761	.8860130	.3844129
	11	131		+6388661	+7184218	+3116971		11	192		-3334971	+8810046	+3822407
	12	132		.6257202	.7283479	.3160039		12	193		.3494231	.8757469	.3799603
	13	133		.6123955	.7380639	.3202196		13	194		.3652495	.8702417	.3775725
	14	134		.5988948	.7475671	.3243431		14	195		.3809714	.8644908	.3750780
	15	135		.5852228	.7568549	.3283734		15	196		.3965842	.8584962	.3724775
	16	136		+5713838	+7659248	+3323092		16	197		-4120835	+8522600	+3697721
	17	137		.5573821	.7747744	.3361495		17	198		.4274650	.8457842	.3669627
	18	138		.5432221	.7834016	.3398032		18	199		.4427247	.8390708	.3640501
	19	139		.5289085	.7918046	.3435396		19	200		.4578587	.8321220	.3610351
	20	140		.5144458	.7999813	.3470877		20	201		.4728631	.8249399	.3579187
	21	141		+4998332	+8079298	+3505367		21	202		-4877337	+8175265	+3547019
	22	142		.4850898	.8156482	.3538857		22	203		.5024664	.8098838	.3513854
	23	143		.4702347	.8231347	.3571340		23	204		.5170575	.8020139	.3479703
	24	144		.4551872	.8303878	.3602408		24	205		.5315032	.7939189	.3444576
	25	145		.4400413	.8374058	.3633255		25	206		.5457997	.7856009	.3408482
	26	146		+4247708	+8441869	+3662673		26	207		-5599432	+7770619	+3371429
	27	147		.4093799	.8507297	.3691056		27	208		.5739300	.7683039	.3333425
	28	148		.3938729	.8570325	.3718396		28	209		.5877562	.7593290	.3294481
	29	149		.3782539	.8630935	.3744685		29	210		.6014178	.7501392	.3254616
	30	150		.3625272	.8689108	.3769918		30	211		.6149108	.7407367	.3213810
	31	151		+3466763	+8744827	+3794087	Aug.	1	212		-6282311	+7311238	+3172104
June	1	152		.3307669	.8798076	.3817184		2	213		.6413748	.7213030	.3129497
	2	153		.3147419	.8848838	.3839203		3	214		.6543378	.7112767	.3086000
	3	154		.2986261	.8897098	.3860136		4	215		.6671160	.7010472	.3041624
	4	155		.2824243	.8942840	.3879977		5	216		.6797053	.6906174	.2996379
	5	156		+2661410	+8986048	+3898720		6	217		-6921018	+6799904	+2960278
	6	157		.2497806	.9026708	.3916369		7	218		.7043014	.6691691	.2903334
	7	158		.2333482	.9064805	.3932990		8	219		.7163001	.6581567	.2855561
	8	159		.2168489	.9100325	.3948303		9	220		.7280941	.6469561	.2806972
	9	160		.2002877	.9133257	.3962594		10	221		.7396796	.6355706	.2757580
	10	161		+1836694	+9163593	+3975760		11	222		-7510532	+6240039	+2707401
	11	162		.1669091	.9191326	.3987797		12	223		.7622116	.6122594	.2656450
	12	163		.1502818	.9216447	.3998702		13	224		.7731517	.6003408	.2604743
	13	164		.1335227	.9238152	.4008473		14	225		.7838703	.5882518	.2552296
	14	165		.1167271	.9258839	.4017109		15	226		.7943640	.5759962	.2499123
	15	166		+0999000	+9276104	+4024607		16	227		-8046301	+5635775	+2445241
	16	167		.0830462	.9290745	.4030966		17	228		.8146660	.5509993	.2390666
	17	168		.0661705	.9302763	.4036185		18	229		.8244689	.5382652	.2335412
	18	169		.0492778	.9312158	.4040266		19	230		.8340361	.5253789	.2279495
	19	170		.0323728	.9318932	.4043208		20	231		.8433653	.5123439	.2222933
	20	171		+0154601	+9323089	+4045011		21	232		-8524540	+4991638	+2165742
	21	172		-.0014559	.9324629	.4045678		22	233		.8612997	.4858424	.2129738
	22	173		.0183708	.9323554	.4045209		23	234		.8698998	.4729834	.2095336
	23	174		.0352800	.9319865	.4043605		24	235		.8782520	.4587900	.1990551
	24	175		.0521791	.9313566	.4040867		25	236		.8863542	.4450652	.1930998
	25	176		-.0690634	+9304658	+4036997		26	237		-8942040	+4312124	+1870892
	26	177		.0859284	.9283143	.4031995		27	238		.9017989	.4172354	.1810249
	27	178		.1027637	.9279024	.4025863		28	239		.9091362	.4031381	.1749084
	28	179		.1195831	.9262304	.4018603		29	240		.9162135	.3889239	.1687415
	29	180		.1363643	.9242987	.4010216		30	241		.9230283	.3745966	.1625257
	30	181		-.1531087	+9221073	+4000703		31	242		-9295782	+3601601	+1562627
	31	182		-.1698118	+9196564	+3990066		31	243		-.9358608	+3456187	+1499541

# 244 SUN'S COÖRDINATES, 1869.

Greenwich Mean Noon.		X.	Y.	Z.	Greenwich Mean Noon.		X.	Y.	Z.	
Sept. 1	244 <sup>d</sup>	-.9418736	+ .3309764	+ .1436016	Nov. 1	305 <sup>d</sup>	-.7693362	-.5742351	-.2491434	
	2	.9476143	.3162373	.1372072		2	306	.7580762	.5863479	.2543987
	3	.9530807	.3014056	.1307728		3	307	.7465844	.5982823	.2595767
	4	.9582706	.2864856	.1243001		4	308	.7348644	.6100342	.2646776
	5	.9631824	.2714817	.1177911		5	309	.7229198	.6215995	.2696937
	6	.9678145	+ .2563984	+ .1112475		6	310	-.7107545	-.6327743	-.2746293
	7	.9721648	.2412407	.1046714		7	311	.6983725	.6441549	.2794488
	8	.9762318	.2260133	.0980648		8	312	.6857776	.6551377	.2842466
	9	.9800141	.2107206	.0914297		9	313	.6729738	.6659194	.2889251
	10	.9835105	.1953673	.0847682		10	314	.6599652	.6764166	.2935150
	11	.9867199	+ .1799584	+ .0780825		11	315	-.6467558	-.6866659	-.2980147
	12	.9896416	.1644985	.0713747		12	316	.6333499	.6970242	.3024227
	13	.9922749	.1489921	.0646464		13	317	.6197518	.7067687	.3067378
	14	.9946191	.1334436	.0578997		14	318	.6059659	.7166966	.3109588
	15	.9966736	.1178576	.0511367		15	319	.5919963	.7262051	.3150844
	16	.9984379	+ .1022388	+ .0443593		16	320	-.5778469	-.7354912	-.3191134
	17	.9999116	.0865917	.0375696		17	321	.5635217	.7445524	.3230447
	18	1.0010944	.0709205	.0307696		18	322	.5490248	.7533862	.3267773
	19	1.0019861	.0552296	.0239611		19	323	.5343604	.7619899	.3306161
	20	1.0025859	.0395229	.0171457		20	324	.5195326	.7703610	.3342418
21	264	-1.0028938	+ .0238046	+ .0103255	21	325	-.5045456	-.7784969	-.3377713	
22	265	1.0029092	+ .0080793	+ .0035024	22	326	.4894035	.7863950	.3411974	
23	266	1.0026320	-.0076489	-.0033217	23	327	.4741105	.7940526	.3445190	
24	267	1.0024618	.0233756	.0101451	24	328	.4586709	.8014672	.3477352	
25	268	1.0011984	.0390966	.0169657	25	329	.4436891	.8086360	.3508448	
26	269	-1.0000417	-.0548076	-.0237818	26	330	-.4273694	-.8155565	-.3538468	
27	270	.9985915	.0705039	.0305914	27	331	.4115164	.8222261	.3567400	
28	271	.9968475	.0861808	.0373926	28	332	.3955348	.8286424	.3597234	
29	272	.9948093	.1018333	.0441834	29	333	.3794293	.8348030	.3621160	
30	273	.9924768	.1174581	.0509616	30	334	.3632049	.8407053	.3647567	
Oct. 1	274	-.9898503	-.1330483	-.0577253	Dec. 1	335	-.3468670	-.8463470	-.3672046	
	2	.9869299	.1486013	.0644726		2	336	.3304208	.8517262	.3696387
	3	.9837162	.1641107	.0712013		3	337	.3138714	.8568407	.3717581
	4	.9802797	.1795718	.0779092		4	338	.2972241	.8616886	.3736620
	5	.9764112	.1949798	.0845941		5	339	.2804845	.8662663	.3758496
	6	.9723216	-.2103299	-.0912539		6	340	-.2636584	-.8705784	-.3777203
	7	.9679418	.2256170	.0978866		7	341	.2467513	.8746174	.3794734
	8	.9632732	.2408369	.1044899		8	342	.2297686	.8783841	.3811084
	9	.9583171	.2559822	.1110618		9	343	.2127159	.8818774	.3826247
	10	.9530749	.2710508	.1176061		10	344	.1955985	.8850965	.3840219
	11	.9475484	-.2860370	-.1241028		11	345	-.1784218	-.8880407	-.3852998
	12	.9417394	.3009363	.1305679		12	346	.1611912	.8907092	.3864580
	13	.9356496	.3157445	.1369936		13	347	.1439122	.8931014	.3874961
	14	.9292810	.3304574	.1433779		14	348	.1265902	.8952168	.3884140
	15	.9226356	.3450706	.1497189		15	349	.1092304	.8970549	.3892114
	16	.9157154	-.3595796	-.1560146		16	350	-.0918378	-.8986153	-.3898882
	17	.9085226	.3739802	.1622632		17	351	.0744175	.8998976	.3904443
	18	.9010593	.3882683	.1684628		18	352	.0569745	.9009017	.3908795
	19	.8933273	.4024399	.1746117		19	353	.0395138	.9016274	.3911938
	20	.8853287	.4164911	.1807082		20	354	.0220406	.9020744	.3913871
21	.8770657	-.4304179	-.1867507	21	355	-.0045600	-.9029242	-.3914592		
22	.8685403	.4442162	.1927374	22	356	+ .0129229	.9021311	.3914101		
23	.8597545	.4578823	.1986664	23	357	.0304029	.9017402	.3912397		
24	.8507103	.4714121	.2045361	24	358	.0478748	.9010694	.3909480		
25	.8414100	.4848014	.2103447	25	359	.0653333	.9001186	.3905351		
26	.8318558	-.4980457	-.2160903	26	360	+ .0827731	-.8988876	-.3900008		
27	.8221499	.5111409	.2217713	27	361	.1001889	.8973765	.3893451		
28	.8119947	.5240829	.2273858	28	362	.1175753	.8955853	.3886681		
29	.8016930	.5368676	.2329320	29	363	.1349264	.8935143	.3876698		
30	.7911475	.5494907	.2384082	30	364	.1522365	.8911639	.3866503		
31	.7803610	-.5619480	-.2438126	31	365	+ .1695000	-.8885347	-.3855101		
32	.7693362	-.5742351	-.2491434	32	366	+ .1867112	-.8856278	-.3842495		

# MOON'S LONGITUDE, &c., 1869. 245

FOR GREENWICH MEAN NOON AND MIDNIGHT.						
Day of Month.	JANUARY.		FEBRUARY.		MARCH.	
	True Longitude.	Latitude.	True Longitude.	Latitude.	True Longitude.	Latitude.
1.0	141° 7' 5.8	+0° 21' 23.2	194° 16' 32.5	+4° 28' 21.0	203° 8' 13.5	+4° 48' 50.5
1.5	148 26 9.3	1 1 2.0	201 23 56.4	4 47 26.1	210 24 29.0	5 2 19.9
2.0	155 43 0.9	1 39 30.7	208 25 34.5	5 1 55.5	217 34 8.8	5 10 51.9
2.5	162 57 9.3	2 16 9.8	215 21 21.2	5 11 47.1	224 36 51.5	5 14 31.9
3.0	170 8 9.8	2 50 24.2	222 11 18.2	5 17 4.1	231 32 27.5	5 13 31.1
3.5	177 15 44.0	3 21 43.1	228 55 32.6	5 17 53.5	238 20 57.6	5 8 4.4
4.0	184 19 39.4	3 49 40.6	235 34 17.1	5 14 25.2	245 2 31.6	4 58 29.6
4.5	191 19 48.1	4 13 56.0	242 7 47.5	5 6 52.4	251 37 26.7	4 45 6.5
5.0	198 16 6.3	4 34 13.7	248 36 22.5	4 55 29.7	258 6 5.9	4 28 16.1
5.5	205 8 33.6	4 50 22.5	255 0 22.1	4 40 33.2	264 28 56.5	4 8 19.8
6.0	211 57 12.0	5 2 15.2	261 20 8.2	4 22 20.3	270 46 29.3	3 45 39.0
6.5	218 42 5.3	5 9 49.2	267 36 2.1	4 1 9.3	276 59 16.9	3 20 34.8
7.0	225 23 17.9	5 13 5.4	273 48 25.3	3 37 19.2	283 7 53.1	2 53 28.1
7.5	232 0 54.8	5 12 8.1	279 57 39.1	3 11 9.5	289 12 51.1	2 24 39.4
8.0	238 35 1.1	5 7 4.5	286 4 3.9	2 43 0.1	295 14 44.3	1 54 28.8
8.5	245 5 41.8	4 58 4.5	292 7 59.0	2 13 11.4	301 14 5.1	1 23 16.2
9.0	251 33 1.7	4 45 20.7	298 9 42.6	1 42 3.9	307 11 23.3	0 51 20.8
9.5	257 57 5.3	4 29 7.8	304 9 32.2	1 9 58.3	313 7 7.8	+0 19 1.9
10.0	264 17 57.3	4 9 42.6	310 7 44.1	0 37 15.3	319 1 44.8	-0 13 21.3
10.5	270 35 42.1	3 47 23.3	316 4 33.9	+0 4 15.8	324 55 38.6	0 45 29.9
11.0	276 50 24.8	3 22 29.7	322 0 17.1	-0 28 40.1	330 49 11.2	1 17 5.1
11.5	283 2 11.1	2 55 22.4	327 55 9.0	1 1 12.2	336 42 42.4	1 47 48.3
12.0	289 11 7.5	2 26 22.8	333 49 24.6	1 33 0.8	342 36 30.3	2 17 21.2
12.5	295 17 22.1	1 55 53.0	339 43 19.6	2 3 47.1	348 30 51.2	2 45 25.9
13.0	301 21 4.5	1 24 15.0	345 37 10.2	2 33 12.9	354 25 59.7	3 11 45.2
13.5	307 22 26.0	0 51 50.6	351 31 13.7	3 1 0.6	0 22 9.2	3 36 2.4
14.0	313 21 40.1	+0 19 1.3	357 25 48.6	3 26 53.9	6 19 33.0	3 58 1.7
14.5	319 19 2.5	-0 13 52.2	3 21 14.7	3 50 36.9	12 18 23.2	4 17 28.0
15.0	325 14 51.4	0 46 29.5	9 17 53.2	4 11 54.9	18 18 52.2	4 34 7.9
15.5	331 9 27.4	1 18 31.4	15 16 6.9	4 30 34.0	24 21 12.4	4 47 48.5
16.0	337 3 13.4	1 49 39.5	21 16 20.4	4 46 21.3	30 25 36.9	4 58 18.7
16.5	342 56 35.0	2 19 36.2	27 18 59.5	4 59 4.5	36 32 19.9	5 5 28.7
17.0	348 49 59.9	2 48 4.6	33 24 31.6	5 8 31.8	42 41 36.7	5 9 10.2
17.5	354 43 58.3	3 14 48.9	39 33 24.8	5 14 32.8	48 53 43.8	5 9 16.4
18.0	0 39 1.9	3 39 33.5	45 46 8.3	5 16 57.9	55 8 59.0	5 5 42.1
18.5	6 35 44.4	4 2 3.4	52 3 11.3	5 15 38.6	61 27 41.4	4 58 23.9
19.0	12 34 40.8	4 22 4.0	58 25 3.0	5 10 27.0	67 50 11.4	4 47 20.6
19.5	18 36 27.0	4 39 20.8	64 52 11.4	5 1 17.9	74 16 50.1	4 32 32.9
20.0	24 41 38.9	4 53 39.6	71 25 2.9	4 48 7.3	80 47 58.6	4 14 3.8
20.5	30 50 52.0	5 4 46.5	78 4 0.9	4 30 54.2	87 23 58.5	3 51 59.3
21.0	37 4 41.2	5 12 27.8	84 49 24.4	4 9 40.7	94 5 10.4	3 26 28.4
21.5	43 23 39.8	5 16 30.2	91 41 27.5	3 44 33.0	100 51 52.2	2 57 43.4
22.0	49 48 18.1	5 16 41.6	98 40 17.3	3 15 42.1	107 44 18.1	2 26 1.1
22.5	56 19 2.7	5 12 50.7	105 45 52.0	2 43 24.5	114 42 37.8	1 51 42.4
23.0	62 56 15.6	5 4 48.5	112 58 0.4	2 8 2.8	121 46 56.0	1 15 13.0
23.5	69 40 12.0	4 52 28.5	120 16 20.9	1 30 6.5	128 57 9.7	-0 37 3.7
24.0	76 31 0.2	4 35 47.9	127 40 20.5	0 50 11.5	136 13 5.4	+0 2 10.0
24.5	83 28 39.7	4 14 48.1	135 9 15.2	-0 8 59.8	143 34 19.1	0 41 47.8
25.0	90 33 0.5	3 49 36.3	142 42 10.4	+0 32 41.9	151 0 15.6	1 21 5.8
25.5	97 43 42.2	3 20 26.0	150 18 2.3	1 14 3.4	158 30 9.7	1 59 17.8
26.0	105 0 14.2	2 47 37.8	157 55 39.6	1 54 13.0	166 3 5.2	2 35 37.1
26.5	112 21 55.6	2 11 39.3	165 33 46.9	2 32 20.7	173 37 56.5	3 9 18.1
27.0	119 47 56.3	1 33 5.2	173 11 6.7	3 7 39.3	181 13 31.3	3 39 38.5
27.5	127 17 18.5	0 52 36.8	180 46 22.1	3 39 27.7	188 48 32.7	4 6 1.7
28.0	134 48 58.6	-0 11 0.3	188 18 20.1	4 7 11.4	196 21 43.4	4 27 58.4
28.5	142 21 49.6	+0 30 54.8	195 45 55.6	4 30 24.7	203 51 47.8	4 45 6.8
29.0	149 54 43.3	1 12 18.2	203 8 13.5	4 48 50.5	211 17 36.3	4 57 14.7
29.5	157 26 32.5	1 52 20.4	210 24 29.0	5 2 19.9	218 38 8.2	5 4 18.0
30.0	164 56 14.1	2 30 14.7	217 34 8.8	5 10 51.9	225 52 33.3	5 6 20.9
30.5	172 22 50.6	3 5 19.7	224 36 51.5	5 14 31.9	233 0 13.1	5 3 34.5
31.0	179 45 32.0	3 37 0.1	231 32 27.5	5 13 31.1	240 0 42.5	4 56 15.1
31.5	187 3 36.7	+4 4 47.6	238 20 57.6	+5 8 4.4	246 53 48.7	+4 44 43.6

# 246 MOON'S LONGITUDE, &c., 1869.

FOR GREENWICH MEAN NOON AND MIDNIGHT.						
Day of Month.	APRIL.		MAY.		JUNE.	
	True Longitude.	Latitude.	True Longitude.	Latitude.	True Longitude.	Latitude.
1.0	253° 39' 30.3	+4° 29' 23.2	287° 43' 50.3	+2° 5' 41.1	332° 10' 13.3	-1° 58' 38.0
1.5	260 17 56.5	4 10 38.7	293 58 54.9	1 34 53.2	338 6 21.3	2 27 18.8
2.0	266 49 25.3	3 48 55.5	300 9 1.3	1 3 21.2	344 1 33.7	2 54 19.8
2.5	273 14 21.9	3 24 38.7	306 14 47.0	+0 31 26.6	349 56 30.2	3 19 27.0
3.0	279 33 17.1	2 58 12.8	312 16 51.8	-0 0 30.6	355 51 49.6	3 42 26.8
3.5	285 46 45.9	2 30 1.1	318 15 56.6	0 32 11.7	1 48 9.7	4 3 5.9
4.0	291 55 26.3	2 0 26.0	324 12 43.0	1 3 19.0	7 46 6.1	4 21 11.4
4.5	297 59 57.8	1 29 48.6	330 7 52.3	1 33 35.9	13 46 12.3	4 36 30.8
5.0	304 1 0.4	0 58 29.0	336 2 4.5	2 2 46.3	19 48 59.0	4 48 51.6
5.5	309 59 13.8	+0 26 46.4	341 55 58.4	2 30 34.8	25 54 53.3	4 58 2.2
6.0	315 55 16.9	-0 5 0.8	347 50 10.5	2 56 46.1	32 4 18.8	5 3 51.5
6.5	321 49 47.3	0 36 34.6	353 45 14.9	3 21 5.2	38 17 34.8	5 6 9.6
7.0	327 43 20.2	1 7 37.7	359 41 42.8	3 43 17.5	44 34 55.8	5 4 47.9
7.5	333 36 28.6	1 37 52.7	5 40 1.9	4 3 8.3	50 56 31.8	4 59 40.0
8.0	339 29 42.7	2 7 2.8	11 40 36.8	4 20 23.5	57 22 27.5	4 50 41.9
8.5	345 23 29.6	2 34 51.1	17 43 47.8	4 34 49.4	63 52 42.8	4 37 52.3
9.0	351 18 13.7	3 1 1.2	23 49 51.5	4 46 13.0	70 27 12.8	4 21 13.8
9.5	357 14 16.0	3 25 16.7	29 59 0.7	4 54 22.5	77 5 47.9	4 0 52.7
10.0	3 11 54.9	3 47 21.7	36 11 24.1	4 59 7.5	83 48 15.0	3 36 59.4
10.5	9 11 25.5	4 7 0.7	42 27 6.6	5 0 19.2	90 34 17.5	3 9 48.9
11.0	15 13 0.2	4 23 59.3	48 46 10.0	4 57 51.0	97 23 36.8	2 39 40.6
11.5	21 16 48.7	4 38 4.0	55 8 32.6	4 51 38.8	104 15 52.7	2 6 58.1
12.0	27 22 58.9	4 49 2.3	61 34 10.2	4 41 41.6	111 10 44.8	1 32 8.8
12.5	33 31 36.8	4 56 43.6	68 2 57.3	4 28 1.4	118 7 52.7	0 55 43.2
13.0	39 42 46.7	5 0 58.8	74 34 47.1	4 10 43.6	125 6 57.0	-0 18 14.8
13.5	45 56 33.0	5 1 41.0	81 9 32.3	3 49 56.9	132 7 39.6	+0 19 41.1
14.0	52 12 59.3	4 58 44.9	87 47 6.2	3 25 53.7	139 9 44.0	0 57 28.2
14.5	58 32 9.5	4 52 8.3	94 27 22.9	2 58 49.9	146 12 55.3	1 34 30.0
15.0	64 54 8.6	4 41 51.1	101 10 17.8	2 29 4.6	153 16 59.7	2 10 10.4
15.5	71 19 2.4	4 27 56.0	107 55 48.0	1 57 0.0	160 21 44.6	2 43 54.8
16.0	77 46 58.4	4 10 28.1	114 43 52.1	1 23 1.1	167 26 57.9	3 15 10.4
16.5	84 18 5.6	3 49 35.4	121 34 30.0	0 47 35.7	174 32 27.3	3 43 27.0
17.0	90 52 34.2	3 25 28.7	128 27 42.6	-0 11 13.7	181 38 0.0	4 8 17.6
17.5	97 30 35.7	2 58 22.0	135 23 31.2	+0 25 33.3	188 43 22.2	4 29 18.8
18.0	104 12 22.5	2 28 31.9	142 21 56.5	1 2 11.8	195 48 18.7	4 46 11.4
18.5	110 58 7.1	1 56 18.6	149 22 57.9	1 38 7.7	202 52 32.4	4 58 40.6
19.0	117 48 1.3	1 22 5.1	156 26 32.5	2 12 46.3	209 55 44.2	5 6 36.2
19.5	124 42 15.5	0 46 17.7	163 32 33.9	2 45 33.0	216 57 33.4	5 9 53.2
20.0	131 40 57.0	-0 9 26.0	170 40 51.2	3 15 54.1	223 57 37.8	5 8 31.5
20.5	138 44 8.9	+0 27 57.2	177 51 8.2	3 43 17.5	230 55 34.2	5 2 36.1
21.0	145 51 48.7	1 5 16.4	185 3 3.4	4 7 13.5	237 50 58.8	4 52 16.6
21.5	153 3 47.0	1 41 54.1	192 16 8.9	4 27 16.2	244 43 28.1	4 37 47.1
22.0	160 19 46.0	2 17 11.0	199 29 51.0	4 43 3.4	251 32 39.9	4 19 26.1
22.5	167 39 19.0	2 50 27.3	206 43 30.8	4 54 18.7	258 18 13.9	3 57 35.1
23.0	175 1 49.8	3 21 3.9	213 56 25.0	5 0 51.2	264 59 52.8	3 32 38.5
23.5	182 26 32.9	3 48 24.1	221 7 48.3	5 2 36.4	271 37 22.5	3 5 2.9
24.0	189 52 34.6	4 11 55.2	228 16 54.0	4 59 36.1	278 10 33.3	2 35 15.8
24.5	197 18 54.4	4 31 9.1	235 22 56.7	4 51 58.3	284 39 20.2	2 3 45.3
25.0	204 44 27.8	4 45 44.6	242 25 13.9	4 39 56.9	291 3 42.6	1 30 59.5
25.5	212 8 8.4	4 55 27.9	249 23 8.2	4 23 51.0	297 23 44.8	0 57 25.6
26.0	219 28 51.0	5 0 12.8	256 16 8.1	4 4 3.5	303 39 36.0	+0 23 29.6
26.5	226 45 35.0	5 0 1.3	263 3 49.8	3 41 0.3	309 51 29.7	-0 10 23.9
27.0	233 57 26.4	4 55 2.3	269 45 57.4	3 15 9.3	315 59 43.8	0 43 52.0
27.5	241 3 40.0	4 45 31.2	276 22 23.1	2 46 59.1	322 4 40.0	1 16 33.5
28.0	248 3 41.1	4 31 48.3	282 53 7.3	2 16 58.5	328 6 43.1	1 48 9.2
28.5	254 57 6.4	4 14 17.8	289 18 17.7	1 45 35.7	334 6 21.3	2 18 21.5
29.0	261 43 43.2	3 53 26.1	295 38 9.2	1 13 17.3	340 4 5.1	2 46 54.2
29.5	268 23 30.0	3 29 41.0	301 53 2.4	0 40 28.3	346 0 27.2	3 13 32.5
30.0	274 56 34.5	3 3 30.5	308 3 23.4	+0 7 32.1	351 56 2.0	3 38 2.7
30.5	281 23 13.3	2 35 21.8	314 9 42.1	-0 25 9.7	357 51 25.2	4 0 12.1
31.0	287 43 50.3	2 5 41.1	320 12 32.3	0 57 17.2	3 47 13.1	4 19 48.6
31.5	293 58 54.9	+1 34 53.2	326 12 30.1	-1 28 32.2	9 44 2.5	-4 36 40.9



# MOON'S LONGITUDE, &c., 1869. 247

FOR GREENWICH MEAN NOON AND MIDNIGHT						
Day of Month.	JULY.		AUGUST.		SEPTEMBER.	
	True Longitude.	Latitude.	True Longitude.	Latitude.	True Longitude.	Latitude.
1.0	3 47 13.1	—4 19 48.6	48 7 20.4	—5 12 10.1	95 4 26.5	—2 47 31.6
1.5	9 44 2.5	4 36 40.9	54 21 31.2	5 4 8.1	101 50 18.3	2 15 9.3
2.0	15 42 29.8	4 50 38.0	60 40 28.8	4 52 20.6	108 42 57.2	1 40 18.5
2.5	21 43 10.5	5 1 29.3	67 4 40.4	4 36 46.4	115 42 28.2	1 3 24.6
3.0	27 46 39.1	5 9 4.7	73 34 29.2	4 17 27.0	122 48 47.3	—0 24 57.9
3.5	33 53 28.2	5 13 14.7	80 10 14.1	3 54 26.8	130 1 39.7	+0 14 26.1
4.0	40 4 7.6	5 13 50.6	86 52 8.2	3 27 54.1	137 20 39.9	0 54 7.1
4.5	46 19 4.0	5 10 44.9	93 40 17.9	2 58 1.4	144 45 10.2	1 33 20.9
5.0	52 38 40.5	5 3 51.4	100 34 42.3	2 25 6.4	152 14 21.5	2 11 20.7
5.5	59 3 15.5	4 53 5.8	107 35 12.5	1 49 32.2	159 47 14.3	2 47 19.0
6.0	65 33 2.3	4 38 26.5	114 41 30.4	1 11 47.4	167 22 40.0	3 20 29.9
6.5	72 8 8.7	4 19 55.4	121 53 9.5	—0 32 26.5	174 59 23.7	3 50 10.9
7.0	78 48 36.4	3 57 37.9	129 9 34.7	+0 7 51.4	182 36 7.0	4 15 45.2
7.5	85 34 20.6	3 31 43.7	136 30 2.5	0 48 23.3	190 11 30.8	4 36 43.2
8.0	92 25 9.9	3 2 27.5	143 53 43.0	1 28 23.3	197 44 19.8	4 52 43.8
8.5	99 20 46.9	2 30 9.2	151 19 40.7	2 7 4.9	205 13 25.0	5 3 34.9
9.0	106 20 48.0	1 55 14.0	158 46 56.7	2 43 42.4	212 37 46.5	5 9 13.2
9.5	113 24 44.8	1 18 12.0	166 14 30.3	3 17 32.9	219 56 35.4	5 9 43.3
10.0	120 32 4.4	0 39 37.8	173 41 21.5	3 47 57.9	227 9 15.3	5 5 17.0
10.5	127 42 10.6	—0 0 9.6	181 6 33.5	4 14 25.1	234 15 22.0	4 56 11.4
11.0	134 54 25.6	+0 39 31.8	188 29 14.1	4 36 28.8	241 14 42.9	4 42 47.9
11.5	142 8 10.6	1 18 44.3	195 48 37.3	4 53 50.6	248 7 16.8	4 25 30.7
12.0	149 22 46.8	1 56 46.2	203 4 4.7	5 6 19.8	254 53 11.0	4 4 45.8
12.5	156 37 37.1	2 32 57.0	210 15 5.9	5 13 52.3	261 32 40.7	3 40 59.9
13.0	163 52 6.5	3 6 38.8	217 21 18.8	5 16 30.3	268 6 7.0	3 14 39.9
13.5	171 5 42.6	3 37 17.5	224 22 29.3	5 14 21.2	274 33 55.1	2 46 11.8
14.0	178 17 56.4	4 4 23.6	231 18 30.2	5 7 37.3	280 56 33.2	2 16 1.6
14.5	185 28 22.5	4 27 32.6	238 9 20.8	4 56 34.5	287 14 30.9	1 44 34.1
15.0	192 36 38.9	4 46 25.3	244 55 5.7	4 41 31.5	293 28 18.7	1 12 13.1
15.5	199 42 27.2	5 0 47.9	251 35 53.6	4 22 49.0	299 38 26.9	0 39 21.2
16.0	206 45 32.1	5 10 32.0	258 11 56.6	4 0 49.4	305 45 24.8	+0 6 20.7
16.5	213 45 40.9	5 15 34.3	264 43 29.2	3 35 56.2	311 49 40.4	—0 26 27.6
17.0	220 42 43.9	5 15 56.3	271 10 47.7	3 8 33.4	317 51 39.9	0 58 43.4
17.5	227 36 33.2	5 11 43.8	277 34 8.8	2 39 5.6	323 51 47.5	1 30 7.5
18.0	234 27 2.6	5 3 6.9	283 53 50.0	2 7 57.3	329 50 25.0	2 0 21.3
18.5	241 14 7.5	4 50 19.0	290 10 8.6	1 35 33.0	335 47 52.8	2 29 7.4
19.0	247 57 44.6	4 33 36.8	296 23 21.5	1 2 17.0	341 44 28.5	2 56 9.0
19.5	254 37 51.5	4 13 19.7	302 33 44.8	+0 28 33.0	347 40 28.0	3 21 10.7
20.0	261 14 26.8	3 49 49.4	308 41 34.1	—0 5 15.7	353 36 6.1	3 43 57.8
20.5	267 47 30.1	3 23 29.5	314 47 4.0	0 38 46.6	359 31 35.7	4 4 17.1
21.0	274 17 2.0	2 54 44.7	320 50 28.7	1 11 38.2	5 27 9.3	4 21 56.5
21.5	280 43 4.1	2 24 0.9	326 52 1.7	1 43 29.9	11 22 58.8	4 36 45.5
22.0	287 5 39.0	1 51 44.4	332 51 56.6	2 14 2.4	17 19 16.0	4 48 34.7
22.5	293 24 50.9	1 18 21.4	338 50 26.8	2 42 57.6	23 16 13.2	4 57 16.5
23.0	299 40 45.3	0 44 17.9	344 47 46.3	3 9 58.8	29 14 3.4	5 2 44.5
23.5	305 53 29.5	+0 9 59.2	350 44 9.7	3 34 50.7	35 13 0.7	5 4 54.3
24.0	312 3 12.5	—0 24 10.4	356 39 52.3	3 57 19.4	41 13 20.9	5 3 42.5
24.5	318 10 5.4	—0 57 48.0	2 35 11.1	4 17 12.5	47 15 21.4	4 59 7.5
25.0	324 14 21.5	1 30 32.1	8 30 23.8	4 34 19.1	53 19 21.7	4 51 9.0
25.5	330 16 16.4	2 2 2.7	14 25 50.1	4 48 29.3	59 25 43.7	4 39 48.4
26.0	336 16 7.8	2 32 1.4	20 21 51.2	4 59 34.6	65 34 51.3	4 25 8.4
26.5	342 14 15.6	3 0 11.5	26 18 50.3	5 7 27.9	71 47 10.3	4 7 13.6
27.0	348 11 2.0	3 26 17.8	32 17 12.5	5 12 3.0	78 3 8.3	3 46 10.2
27.5	354 6 51.2	3 50 6.5	38 17 24.6	5 13 14.9	84 23 14.1	3 22 6.3
28.0	0 2 9.7	4 11 25.1	44 19 54.8	5 10 59.5	90 47 57.2	2 55 12.5
28.5	5 57 25.5	4 30 2.2	50 25 13.3	5 5 13.7	97 17 47.0	2 25 41.5
29.0	11 53 8.7	4 45 47.5	56 33 51.2	4 55 55.6	103 53 11.7	1 53 49.4
29.5	17 49 50.7	4 58 31.5	62 46 20.0	4 43 4.7	110 34 36.9	1 19 55.3
30.0	23 48 4.0	5 8 5.4	69 3 11.6	4 26 42.1	117 22 24.8	0 44 22.1
30.5	29 48 22.0	5 14 21.2	75 24 57.6	4 6 50.7	124 16 52.3	—0 7 36.5
31.0	35 51 18.4	5 17 11.5	81 52 7.7	3 43 35.9	131 18 8.7	+0 29 50.3
31.5	41 57 26.8	—5 16 29.7	88 25 9.3	—3 17 5.8	138 26 14.6	+1 7 23.4

# 248 MOON'S LONGITUDE, &c., 1869.

FOR GREENWICH MEAN NOON AND MIDNIGHT.

Day of Month.	OCTOBER.		NOVEMBER.		DECEMBER.	
	True Longitude.	Latitude.	True Longitude.	Latitude.	True Longitude.	Latitude.
1.0	131° 18' 8.7	+0° 29' 50.3	184° 9' 38.9	+4° 24' 43.3	223° 1' 52.9	+4° 58' 8.2
1.5	138 26 14.6	1 7 23.4	191 40 19.4	4 41 3.6	230 22 19.6	4 46 40.1
2.0	145 40 59.7	1 44 23.8	199 13 11.2	4 52 34.5	237 40 55.4	4 30 32.6
2.5	153 2 1.5	2 20 9.7	206 47 1.4	4 58 59.1	244 56 43.2	4 10 7.0
3.0	160 28 44.5	2 53 57.7	214 20 31.3	5 0 9.3	252 8 49.5	3 45 50.4
3.5	168 0 19.9	3 25 3.9	221 52 21.5	4 56 5.7	259 16 27.1	3 18 14.3
4.0	175 35 46.2	3 52 46.4	229 21 14.6	4 46 57.7	266 18 56.0	2 47 53.2
4.5	183 13 51.0	4 16 27.5	236 45 58.8	4 33 2.7	273 15 45.7	2 15 22.9
5.0	190 53 13.5	4 35 34.9	244 5 31.9	4 14 44.8	280 6 34.7	1 41 19.6
5.5	198 32 27.1	4 49 44.1	251 19 2.4	3 52 33.7	286 51 11.4	1 6 18.2
6.0	206 10 5.8	4 58 39.8	258 25 51.9	3 27 2.3	293 29 33.4	+0 30 51.8
6.5	213 44 45.5	5 2 16.0	265 25 34.9	2 58 45.2	300 1 46.3	-0 4 29.1
7.0	221 15 9.4	5 0 36.0	272 17 59.1	2 28 17.7	306 28 5.7	0 39 17.0
7.5	228 40 10.8	4 53 51.8	279 3 4.1	1 56 13.8	312 48 49.6	1 13 7.3
8.0	235 58 55.8	4 42 22.4	285 41 0.1	1 23 5.7	319 4 25.5	1 45 38.5
8.5	243 10 44.4	4 26 32.6	292 12 6.6	0 49 23.6	325 15 23.1	2 16 31.9
9.0	250 15 11.0	4 6 50.9	298 36 49.7	+0 15 34.7	331 22 16.2	2 45 31.2
9.5	257 12 3.9	3 43 47.8	304 55 41.6	-0 17 56.4	337 25 40.8	3 12 22.3
10.0	264 1 23.8	3 17 55.0	311 9 17.9	0 50 47.6	343 26 14.3	3 36 53.0
10.5	270 43 22.4	2 49 43.5	317 18 17.3	1 22 39.2	349 24 35.4	3 58 52.4
11.0	277 18 20.2	2 19 43.5	323 23 19.7	1 53 13.6	355 21 22.6	4 18 10.8
11.5	283 46 44.3	1 48 23.5	329 25 5.6	2 22 14.7	1 17 14.0	4 34 39.7
12.0	290 9 7.1	1 16 10.0	335 24 15.1	2 49 28.1	7 12 46.6	4 48 11.0
12.5	296 26 4.3	0 43 27.8	341 21 27.1	3 14 40.5	13 8 36.3	4 58 37.6
13.0	302 38 13.3	+0 10 39.8	347 17 19.0	3 37 39.7	19 5 16.5	5 5 52.8
13.5	308 46 12.3	-0 21 52.8	353 12 26.0	3 58 14.2	25 3 18.6	5 9 50.9
14.0	314 50 39.2	0 53 50.3	359 7 20.7	4 16 13.2	31 3 11.0	5 10 26.8
14.5	320 52 11.1	1 24 54.5	5 2 33.0	4 31 26.8	37 5 19.5	5 7 36.6
15.0	326 51 23.3	1 54 48.2	10 58 29.6	4 43 45.5	43 10 6.3	5 1 17.6
15.5	332 48 49.1	2 23 15.2	16 55 33.7	4 53 1.0	49 17 50.1	4 51 28.6
16.0	338 44 59.2	2 50 0.3	22 54 6.1	4 59 5.7	55 28 46.1	4 38 10.5
16.5	344 40 21.6	3 14 48.8	28 54 23.2	5 1 53.5	61 43 5.7	4 21 26.7
17.0	350 35 21.3	3 37 27.2	34 56 38.8	5 1 19.5	68 0 56.4	4 1 22.7
17.5	356 30 20.4	3 57 42.7	41 1 3.5	4 57 20.4	74 22 22.4	3 38 7.2
18.0	2 25 38.1	4 15 23.1	47 7 45.5	4 49 55.0	80 47 24.3	3 11 52.3
18.5	8 21 31.0	4 30 17.7	53 16 50.4	4 39 4.2	87 15 59.6	2 42 53.3
19.0	14 18 13.0	4 42 16.5	59 28 22.0	4 24 51.1	93 48 3.3	2 11 28.8
19.5	20 15 55.8	4 51 11.1	65 42 22.4	4 7 21.4	100 23 28.4	1 38 1.0
20.0	26 14 49.3	4 56 54.3	71 58 53.4	3 46 43.6	107 2 6.2	1 2 55.0
20.5	32 15 2.3	4 59 20.7	78 17 56.5	3 23 8.7	113 43 47.3	-0 26 38.7
21.0	38 16 42.3	4 58 26.5	84 39 33.2	2 56 50.2	120 28 21.8	+0 10 17.5
21.5	44 19 56.5	4 54 10.0	91 3 46.2	2 28 4.7	127 15 39.8	0 47 21.8
22.0	50 24 52.4	4 46 31.2	97 30 39.7	1 57 10.8	134 5 31.9	1 24 1.0
22.5	56 31 38.3	4 35 31.9	104 0 19.3	1 24 29.7	140 57 49.2	1 59 41.4
23.0	62 40 23.5	4 21 16.4	110 32 52.5	0 50 24.6	147 52 23.0	2 33 49.5
23.5	68 51 19.1	4 3 50.6	117 8 27.9	-0 15 20.9	154 49 5.3	3 5 52.7
24.0	75 4 38.2	3 43 22.9	123 47 16.1	+0 20 14.6	161 47 48.0	3 35 19.7
24.5	81 20 36.3	3 20 3.3	130 29 28.4	0 55 53.1	168 48 22.8	4 1 41.3
25.0	87 39 30.7	2 54 4.1	137 15 15.8	1 31 4.9	175 50 40.5	4 24 30.9
25.5	94 1 41.1	2 25 39.6	144 4 48.9	2 5 18.9	182 54 30.8	4 43 24.8
26.0	100 27 29.1	1 55 6.3	150 58 16.7	2 38 3.6	189 59 41.4	4 59 3.3
26.5	106 57 17.6	1 22 43.0	157 55 45.0	3 8 47.0	197 5 58.0	5 8 10.3
27.0	113 31 30.2	0 48 50.8	164 57 15.6	3 36 57.2	204 13 3.4	5 13 34.6
27.5	120 10 29.9	-0 13 53.6	172 2 44.8	4 2 3.3	211 20 37.8	5 14 9.6
28.0	126 54 38.8	+0 21 42.6	179 12 2.5	4 23 35.9	218 28 18.3	5 9 54.1
28.5	133 44 16.0	0 57 28.8	186 24 50.8	4 41 8.2	225 35 39.5	5 0 52.2
29.0	140 39 36.5	1 32 53.5	193 40 44.2	4 54 16.8	232 42 13.3	4 47 13.5
29.5	147 40 49.0	2 7 22.9	200 59 8.4	5 2 43.0	239 47 29.9	4 29 13.1
30.0	154 47 55.0	2 40 21.0	208 19 21.4	5 6 13.6	246 50 58.6	4 7 10.6
30.5	162 0 46.0	3 11 10.9	215 40 34.3	5 4 41.9	253 52 8.0	3 41 30.7
31.0	169 19 3.1	3 39 15.1	223 1 52.9	4 58 8.2	260 50 28.1	3 12 41.6
31.5	176 42 15.2	+4 3 57.2	230 22 19.6	+4 46 40.1	267 45 30.6	+2 41 14.4

# **ASTRONOMICAL EPHEMERIS**

**FOR THE**

## **MERIDIAN OF WASHINGTON.**

## 250 OBLIQUITY OF THE ECLIPTIC, &c.

[illegible]

## FOR WASHINGTON MEAN MIDNIGHT.

### LOGARITHMS FOR CORRECTING THE PLACES OF FIXED STARS. (*Bessel's Notation.*)

Date.	A.	B.	C.	D.	Date.	A.	B.	C.	D.
Jan. 1	$\pi$ 0.3319	0.8720	$\pi$ 0.5882	1.3011	Mar. 1	$\pi$ 8.7754	0.7883	$\pi$ 1.2506	0.8074
2	9.3250	0.8711	0.6233	1.2994	2	8.7620	0.7871	1.2530	0.7837
3	9.3180	0.8703	0.6556	1.2976	3	8.7483	0.7859	1.2553	0.7585
4	9.3110	0.8694	0.6856	1.2956	4	8.7342	0.7847	1.2574	0.7317
5	9.3039	0.8684	0.7135	1.2934	5	8.7198	0.7836	1.2595	0.7030
6	$\pi$ 9.2967	0.8675	$\pi$ 0.7395	1.2912	6	$\pi$ 8.7051	0.7825	$\pi$ 1.2613	0.6721
7	9.2895	0.8665	0.7640	1.2887	7	8.6901	0.7814	1.2631	0.6387
8	9.2821	0.8654	0.7870	1.2861	8	8.6745	0.7804	1.2646	0.6024
9	9.2747	0.8643	0.8087	1.2834	9	8.6584	0.7794	1.2661	0.5628
10	9.2672	0.8632	0.8293	1.2805	10	8.6418	0.7785	1.2674	0.5189
11	$\pi$ 9.2596	0.8620	$\pi$ 0.8489	1.2774	11	$\pi$ 8.6247	0.7776	$\pi$ 1.2685	0.4701
12	9.2519	0.8608	0.8674	1.2742	12	8.6070	0.7768	1.2696	0.4148
13	9.2442	0.8596	0.8850	1.2708	13	8.5886	0.7760	1.2705	0.3514
14	9.2363	0.8584	0.9018	1.2673	14	8.5695	0.7752	1.2713	0.2769
15	9.2284	0.8571	0.9178	1.2636	15	8.5495	0.7745	1.2719	0.1870
16	$\pi$ 9.2205	0.8558	$\pi$ 0.9331	1.2597	16	$\pi$ 8.5287	0.7739	$\pi$ 1.2724	0.0737
17	9.2124	0.8545	0.9479	1.2556	17	8.5069	0.7733	1.2728	9.9196
18	9.2042	0.8531	0.9619	1.2514	18	8.4839	0.7727	1.2730	9.6776
19	9.1960	0.8517	0.9755	1.2470	19	8.4597	0.7722	1.2731	9.0864
20	9.1877	0.8503	0.9884	1.2424	20	8.4341	0.7718	1.2731	$\pi$ 9.3655
21	$\pi$ 9.1793	0.8488	$\pi$ 1.0009	1.2376	21	$\pi$ 8.4069	0.7714	$\pi$ 1.2730	$\pi$ 9.7672
22	9.1708	0.8474	1.0128	1.2327	22	8.3777	0.7710	1.2727	9.9722
23	9.1623	0.8459	1.0243	1.2275	23	8.3464	0.7707	1.2723	0.1109
24	9.1536	0.8444	1.0354	1.2222	24	8.3126	0.7704	1.2717	0.2159
25	9.1449	0.8428	1.0461	1.2166	25	8.2758	0.7702	1.2711	0.2999
26	$\pi$ 9.1361	0.8413	$\pi$ 1.0564	1.2108	26	$\pi$ 8.2355	0.7700	$\pi$ 1.2702	$\pi$ 0.3703
27	9.1272	0.8397	1.0663	1.2048	27	8.1912	0.7699	1.2693	0.4306
28	9.1183	0.8381	1.0757	1.1986	28	8.1415	0.7698	1.2683	0.4834
29	9.1092	0.8366	1.0849	1.1922	29	8.0849	0.7697	1.2671	0.5305
30	9.1001	0.8349	1.0938	1.1855	30	8.0195	0.7697	1.2658	0.5726
31	$\pi$ 9.0909	0.8333	$\pi$ 1.1024	1.1786	31	$\pi$ 7.9415	0.7698	$\pi$ 1.2643	$\pi$ 0.6111
Feb. 1	9.0816	0.8317	1.1107	1.1714	Apr. 1	7.8463	0.7699	1.2627	0.6462
2	9.0722	0.8300	1.1186	1.1640	2	7.7226	0.7700	1.2610	0.6785
3	9.0627	0.8284	1.1263	1.1564	3	7.5478	0.7702	1.2592	0.7085
4	9.0532	0.8267	1.1338	1.1484	4	$\pi$ 7.2455	0.7704	1.2572	0.7364
5	$\pi$ 9.0435	0.8251	$\pi$ 1.1409	1.1402	5	$\pi$ 5.3010	0.7707	$\pi$ 1.2550	$\pi$ 0.7625
6	9.0338	0.8234	1.1478	1.1316	6	7.2577	0.7710	1.2527	0.7870
7	9.0239	0.8218	1.1544	1.1228	7	7.5587	0.7713	1.2503	0.8100
8	9.0140	0.8201	1.1609	1.1136	8	7.7364	0.7717	1.2478	0.8317
9	9.0040	0.8184	1.1670	1.1042	9	7.8633	0.7721	1.2451	0.8522
10	$\pi$ 8.9939	0.8168	$\pi$ 1.1730	1.0943	10	7.9624	0.7725	$\pi$ 1.2423	$\pi$ 0.8718
11	8.9837	0.8151	1.1788	1.0841	11	8.0438	0.7730	1.2393	0.8903
12	8.9734	0.8135	1.1844	1.0735	12	8.1129	0.7735	1.2362	0.9080
13	8.9629	0.8119	1.1897	1.0627	13	8.1732	0.7741	1.2329	0.9247
14	8.9523	0.8102	1.1949	1.0512	14	8.2266	0.7746	1.2295	0.9408
15	$\pi$ 8.9416	0.8086	$\pi$ 1.1998	1.0393	15	8.2744	0.7752	$\pi$ 1.2259	$\pi$ 0.9562
16	8.9308	0.8071	1.2045	1.0271	16	8.3181	0.7758	1.2222	0.9709
17	8.9198	0.8055	1.2091	1.0142	17	8.3583	0.7765	1.2183	0.9850
18	8.9087	0.8039	1.2135	1.0009	18	8.3955	0.7772	1.2142	0.9985
19	8.8975	0.8024	1.2177	0.9870	19	8.4302	0.7779	1.2100	1.0115
20	$\pi$ 8.8861	0.8008	$\pi$ 1.2217	0.9726	20	8.4627	0.7786	$\pi$ 1.2056	$\pi$ 1.0240
21	8.8746	0.7993	1.2255	0.9575	21	8.4932	0.7793	1.2011	1.0369
22	8.8629	0.7979	1.2293	0.9418	22	8.5221	0.7801	1.1964	1.0475
23	8.8510	0.7964	1.2327	0.9253	23	8.5495	0.7808	1.1915	1.0587
24	8.8390	0.7950	1.2361	0.9080	24	8.5757	0.7816	1.1864	1.0694
25	$\pi$ 8.8267	0.7936	$\pi$ 1.2393	0.8899	25	8.6005	0.7824	$\pi$ 1.1811	$\pi$ 1.0797
26	8.8143	0.7922	1.2424	0.8709	26	8.6244	0.7832	1.1757	1.0897
27	8.8016	0.7909	1.2453	0.8509	27	8.6473	0.7841	1.1701	1.0993
28	8.7886	0.7896	1.2480	0.8297	28	8.6693	0.7849	1.1642	1.1086
29	$\pi$ 8.7754	0.7883	$\pi$ 1.2506	0.8074	29	8.6905	0.7857	1.1582	1.1175
Jan. 1 to Mar. 20,	E = -0".03.				30	8.7109	0.7866	$\pi$ 1.1520	$\pi$ 1.1269
Mar. 21 to Dec. 31,	E = -0".04.				31	8.7306	0.7874	$\pi$ 1.1455	$\pi$ 1.1345

## FOR WASHINGTON MEAN MIDNIGHT.

LOGARITHMS FOR CORRECTING THE PLACES OF FIXED STARS. (*Bessel's Notation.*)

Date.	A.	B.	C.	D.	Date.	A.	B.	C.	D.
May 1	8.7306	0.7874	n 1.1455	n 1.1345	July 1	9.3794	0.7993	0.5253	n 1.3036
2	8.7497	0.7883	1.1388	1.1426	2	9.3853	0.7984	0.5634	1.3022
3	8.7682	0.7891	1.1319	1.1504	3	9.3911	0.7974	0.5982	1.3007
4	8.7861	0.7899	1.1248	1.1580	4	9.3968	0.7964	0.6303	1.2991
5	8.8035	0.7908	1.1174	1.1652	5	9.4024	0.7954	0.6632	1.2973
6	8.8205	0.7916	n 1.1098	n 1.1723	6	9.4079	0.7943	0.6880	n 1.2954
7	8.8370	0.7925	1.1019	1.1791	7	9.4134	0.7932	0.7139	1.2934
8	8.8530	0.7933	1.0937	1.1857	8	9.4187	0.7920	0.7383	1.2913
9	8.8687	0.7941	1.0851	1.1920	9	9.4239	0.7908	0.7613	1.2890
10	8.8840	0.7949	1.0765	1.1981	10	9.4291	0.7895	0.7831	1.2866
11	8.8988	0.7957	n 1.0675	n 1.2041	11	9.4341	0.7883	0.8037	n 1.2840
12	8.9134	0.7965	1.0 <sup>5</sup> 82	1.2098	12	9.4391	0.7869	0.8232	1.2814
13	8.9276	0.7973	1.0485	1.2153	13	9.4440	0.7856	0.8418	1.2786
14	8.9415	0.7981	1.0385	1.2206	14	9.4488	0.7842	0.8595	1.2756
15	8.9551	0.7988	1.0291	1.2258	15	9.4535	0.7828	0.8765	1.2725
16	8.9684	0.7996	n 1.0174	n 1.2307	16	9.4582	0.7813	0.8926	n 1.2693
17	8.9814	0.8003	1.0063	1.2355	17	9.4627	0.7798	0.9081	1.2659
18	8.9942	0.8010	0.9948	1.2401	18	9.4672	0.7783	0.9228	1.2624
19	9.0067	0.8016	0.9827	1.2446	19	9.4716	0.7767	0.9370	1.2587
20	9.0189	0.8023	0.9703	1.2488	20	9.4760	0.7751	0.9507	1.2548
21	9.0308	0.8029	n 0.9574	n 1.2529	21	9.4802	0.7735	0.9638	n 1.2508
22	9.0426	0.8035	0.9439	1.2568	22	9.4844	0.7718	0.9764	1.2467
23	9.0541	0.8041	0.9298	1.2606	23	9.4885	0.7701	0.9886	1.2424
24	9.0655	0.8046	0.9152	1.2642	24	9.4925	0.7684	1.0003	1.2379
25	9.0766	0.8052	0.9000	1.2677	25	9.4965	0.7667	1.0115	1.2333
26	9.0876	0.8057	n 0.8841	n 1.2710	26	9.5004	0.7649	1.0225	n 1.2294
27	9.0983	0.8061	0.8675	1.2742	27	9.5042	0.7631	1.0329	1.2234
28	9.1089	0.8066	0.8500	1.2772	28	9.5080	0.7613	1.0431	1.2182
29	9.1193	0.8070	0.8317	1.2801	29	9.5117	0.7594	1.0529	1.2129
30	9.1294	0.8074	0.8125	1.2828	30	9.5153	0.7576	1.0623	1.2073
31	9.1394	0.8077	n 0.7924	n 1.2854	31	9.5189	0.7557	1.0714	n 1.2016
June 1	9.1493	0.8080	0.7711	1.2879	Aug. 1	9.5224	0.7538	1.0802	1.1956
2	9.1589	0.8083	0.7485	1.2903	2	9.5258	0.7519	1.0888	1.1894
3	9.1684	0.8085	0.7247	1.2925	3	9.5292	0.7499	1.0970	1.1830
4	9.1777	0.8087	0.6993	1.2945	4	9.5325	0.7480	1.1050	1.1764
5	9.1869	0.8089	n 0.6722	n 1.2965	5	9.5357	0.7460	1.1127	n 1.1696
6	9.1959	0.8091	0.6433	1.2983	6	9.5389	0.7441	1.1202	1.1625
7	9.2048	0.8092	0.6120	1.3000	7	9.5421	0.7421	1.1274	1.1552
8	9.2136	0.8092	0.5783	1.3016	8	9.5451	0.7401	1.1344	1.1476
9	9.2221	0.8092	0.5416	1.3030	9	9.5482	0.7381	1.1412	1.1398
10	9.2306	0.8092	n 0.5013	n 1.3043	10	9.5511	0.7361	1.1477	n 1.1317
11	9.2389	0.8091	0.4568	1.3055	11	9.5540	0.7341	1.1541	1.1233
12	9.2471	0.8090	0.4072	1.3065	12	9.5569	0.7321	1.1602	1.1146
13	9.2551	0.8089	0.3510	1.3075	13	9.5597	0.7301	1.1661	1.1057
14	9.2630	0.8087	0.2962	1.3083	14	9.5625	0.7281	1.1718	1.0964
15	9.2708	0.8085	n 0.2101	n 1.3090	15	9.5652	0.7261	1.1773	n 1.0868
16	9.2784	0.8083	0.1176	1.3095	16	9.5679	0.7241	1.1827	1.0768
17	9.2860	0.8080	9.9996	1.3100	17	9.5705	0.7221	1.1878	1.0664
18	9.2934	0.8076	9.8370	1.3103	18	9.5731	0.7201	1.1928	1.0557
19	9.3007	0.8072	n 9.5740	1.3105	19	9.5756	0.7181	1.1976	1.0446
20	9.3078	0.8068	n 8.7924	n 1.3106	20	9.5781	0.7161	1.2023	n 1.0331
21	9.3149	0.8063	p 9.3979	1.3105	21	9.5805	0.7141	1.2067	1.0211
22	9.3218	0.8058	9.7490	1.3104	22	9.5829	0.7122	1.2110	1.0086
23	9.3287	0.8053	9.9415	1.3101	23	9.5853	0.7103	1.2151	0.9956
24	9.3354	0.8047	0.0741	1.3097	24	9.5876	0.7084	1.2191	0.9821
25	9.3420	0.8040	0.1752	n 1.3092	25	9.5899	0.7065	1.2229	n 0.9681
26	9.3485	0.8034	0.2572	1.3086	26	9.5921	0.7046	1.2266	0.9534
27	9.3549	0.8026	0.3259	1.3078	27	9.5943	0.7028	1.2301	0.9382
28	9.3612	0.8019	0.3853	1.3069	28	9.5965	0.7010	1.2334	0.9222
29	9.3674	0.8011	0.4373	1.3059	29	9.5986	0.6992	1.2366	0.9054
30	9.3734	0.8002	0.4836	n 1.3048	30	9.6007	0.6975	1.2397	n 0.8879
					31	9.6028	0.6957	1.2426	n 0.8695

E = -0".04

## FOR WASHINGTON MEAN MIDNIGHT.

LOGARITHMS FOR CORRECTING THE PLACES OF FIXED STARS. (*Bessel's Notation.*)

Date.	A.	B.	C.	D.	Date.	A.	B.	C.	D.
Sept. 1	9.6349	0.6941	1.2454	n 0.8501	Nov. 1	9.7143	0.6842	1.1583	1.1172
2	9.6369	0.6924	1.2480	0.8296	2	9.7163	0.6852	1.1519	1.1262
3	9.6389	0.6908	1.2505	0.8081	3	9.7184	0.6863	1.1452	1.1348
4	9.64108	0.6892	1.2529	0.7852	4	9.7205	0.6874	1.1382	1.1432
5	9.6428	0.6877	1.2551	0.7610	5	9.7226	0.6885	1.1311	1.1513
6	9.6447	0.6862	1.2572	n 0.7352	6	9.7247	0.6895	1.1236	1.1591
7	9.6466	0.6847	1.2592	0.7075	7	9.7268	0.6906	1.1159	1.1663
8	9.6485	0.6833	1.2610	0.6779	8	9.7290	0.6917	1.1079	1.1738
9	9.6503	0.6819	1.2627	0.6459	9	9.7311	0.6927	1.0996	1.1809
10	9.6521	0.6806	1.2643	0.6112	10	9.7333	0.6938	1.0910	1.1877
11	9.6539	0.6794	1.2657	n 0.5733	11	9.7355	0.6948	1.0821	1.1942
12	9.6557	0.6781	1.2670	0.5317	12	9.7377	0.6958	1.0729	1.2005
13	9.6575	0.6770	1.2682	0.4856	13	9.7400	0.6968	1.0633	1.2066
14	9.6593	0.6759	1.2693	0.4336	14	9.7422	0.6978	1.0534	1.2125
15	9.6610	0.6748	1.2702	0.3746	15	9.7445	0.6988	1.0431	1.2182
16	9.6627	0.6738	1.2710	n 0.3058	16	9.7467	0.6998	1.0324	1.2236
17	9.6645	0.6728	1.2717	0.2240	17	9.7490	0.7007	1.0213	1.2289
18	9.6662	0.6719	1.2722	0.1225	18	9.7513	0.7016	1.0097	1.2340
19	9.6679	0.6711	1.2726	9.9903	19	9.7536	0.7025	0.9977	1.2389
20	9.6695	0.6703	1.2729	9.7987	20	9.7559	0.7034	0.9853	1.2436
21	9.6412	0.6696	1.2731	n 9.4456	21	9.7582	0.7042	0.9723	1.2481
22	9.6429	0.6689	1.2731	p 8.8513	22	9.7605	0.7050	0.9587	1.2524
23	9.6446	0.6683	1.2730	9.6233	23	9.7628	0.7058	0.9446	1.2566
24	9.6462	0.6677	1.2728	9.8871	24	9.7652	0.7065	0.9298	1.2606
25	9.6479	0.6672	1.2725	0.0496	25	9.7675	0.7072	0.9145	1.2644
26	9.6496	0.6668	1.2720	0.1676	26	9.7699	0.7078	0.8983	1.2681
27	9.6512	0.6664	1.2714	0.2603	27	9.7722	0.7084	0.8814	1.2716
28	9.6529	0.6661	1.2707	0.3365	28	9.7746	0.7090	0.8637	1.2749
29	9.6545	0.6658	1.2698	0.4012	29	9.7770	0.7095	0.8450	1.2781
30	9.6562	0.6656	1.2688	0.4576	30	9.7794	0.7100	0.8254	1.2811
Oct. 1	9.6578	0.6655	1.2677	0.5072	Dec. 1	9.7817	0.7105	0.8048	1.2839
2	9.6595	0.6654	1.2665	0.5517	2	9.7841	0.7109	0.7828	1.2866
3	9.6612	0.6654	1.2651	0.5920	3	9.7865	0.7113	0.7597	1.2891
4	9.6629	0.6654	1.2635	0.6287	4	9.7889	0.7116	0.7350	1.2916
5	9.6645	0.6655	1.2619	0.6625	5	9.7913	0.7118	0.7088	1.2938
6	9.6662	0.6656	1.2601	0.6937	6	9.7936	0.7120	0.6806	1.2959
7	9.6679	0.6658	1.2582	0.7228	7	9.7960	0.7122	0.6503	1.2979
8	9.6696	0.6661	1.2561	0.7499	8	9.7984	0.7123	0.6177	1.2997
9	9.6713	0.6664	1.2539	0.7753	9	9.8007	0.7123	0.5823	1.3014
10	9.6730	0.6668	1.2515	0.7992	10	9.8031	0.7123	0.5435	1.3029
11	9.6748	0.6672	1.2490	0.8218	11	9.8055	0.7123	0.5007	1.3043
12	9.6765	0.6676	1.2464	0.8431	12	9.8078	0.7122	0.4530	1.3056
13	9.6783	0.6681	1.2436	0.8633	13	9.8102	0.7120	0.3993	1.3067
14	9.6800	0.6687	1.2406	0.8825	14	9.8126	0.7118	0.3381	1.3077
15	9.6818	0.6693	1.2375	0.9007	15	9.8149	0.7115	0.2652	1.3085
16	9.6836	0.6699	1.2343	0.9181	16	9.8172	0.7112	0.1801	1.3092
17	9.6854	0.6706	1.2309	0.9347	17	9.8195	0.7108	0.0726	1.3097
18	9.6872	0.6713	1.2273	0.9505	18	9.8218	0.7103	9.9294	1.3102
19	9.6890	0.6720	1.2235	0.9657	19	9.8241	0.7098	9.7135	1.3104
20	9.6909	0.6728	1.2196	0.9803	20	9.8264	0.7092	9.2625	1.3106
21	9.6927	0.6736	1.2155	0.9943	21	9.8287	0.7086	n 9.1761	1.3106
22	9.6946	0.6744	1.2113	1.0076	22	9.8310	0.7079	9.6849	1.3104
23	9.6965	0.6753	1.2069	1.0205	23	9.8332	0.7071	9.9117	1.3102
24	9.6984	0.6762	1.2023	1.0329	24	9.8355	0.7063	0.0603	1.3098
25	9.7003	0.6771	1.1975	1.0449	25	9.8377	0.7054	0.1709	1.3092
26	9.7023	0.6781	1.1925	1.0564	26	9.8399	0.7045	n 0.2589	1.3085
27	9.7042	0.6791	1.1873	1.0674	27	9.8421	0.7035	0.3318	1.3077
28	9.7062	0.6801	1.1819	1.0781	28	9.8443	0.7024	0.3943	1.3068
29	9.7082	0.6811	1.1764	1.0885	29	9.8465	0.7013	0.4484	1.3057
30	9.7102	0.6821	1.1706	1.0984	30	9.8486	0.7001	0.4967	1.3044
31	9.7122	0.6831	1.1646	1.1080	31	9.8508	0.6988	n 0.5400	1.3031
					32	9.8529	0.6975	n 0.5791	1.3015

E = -0".04

## FOR WASHINGTON MEAN MIDNIGHT.

## CONSTANTS FOR FACILITATING THE REDUCTION OF THE FIXED STARS.

1869.	$\tau$ .	$f$ .	Log $g$ .	G.	Log $h$ .	H.	Log $i$ .	$i$ .	$f$ .	G.	H.
Jan. 1	0.0052	— 9.93	0.9346	120° 2'	1.3091	349° 2'	0.2256	—1.68	—0.662	<sup>h</sup> 8 0.1	<sup>h</sup> 43 16.1
2	.0080	9.77	.9323	119 42	.3088	348 6	.2606	1.82	.651	7 58.8	43 12.4
3	.0107	9.62	.9300	119 21	.3086	347 9	.2930	1.96	.641	7 57.4	23 8.6
4	.0134	9.46	.9276	119 0	.3083	346 13	.3230	2.10	.631	7 56.0	23 4.9
5	.0162	9.31	.9252	118 40	.3080	345 16	.3509	2.24	.621	7 54.7	23 1.1
6	.0189	— 9.16	0.9228	118 19	1.3076	344 19	0.3769	—2.38	—0.611	7 53.3	22 57.3
7	.0216	9.01	.9204	117 59	.3073	343 22	.4013	2.52	.601	7 51.9	22 53.5
8	.0244	8.85	.9180	117 38	.3069	342 25	.4244	2.66	.590	7 50.5	22 49.7
9	.0271	8.70	.9156	117 17	.3065	341 28	.4461	2.79	.580	7 49.1	22 45.9
10	.0299	8.56	.9131	116 57	.3061	340 31	.4667	2.93	.571	7 47.8	22 42.1
11	.0326	— 8.41	0.9107	116 36	1.3057	339 33	0.4863	—3.06	—0.561	7 46.4	22 38.2
12	.0353	8.26	.9082	116 16	.3052	338 36	.5047	3.20	.551	7 45.1	22 34.4
13	.0381	8.12	.9057	115 56	.3048	337 38	.5224	3.33	.541	7 43.7	22 30.5
14	.0408	7.97	.9032	115 35	.3043	336 41	.5392	3.46	.531	7 42.3	22 26.7
15	.0436	7.83	.9007	115 15	.3038	335 43	.5552	3.59	.522	7 41.0	22 22.9
16	.0463	— 7.69	0.8982	114 55	1.3033	334 45	0.5705	—3.72	—0.513	7 39.7	22 19.0
17	.0490	7.54	.8957	114 34	.3028	333 47	.5853	3.85	.503	7 38.3	22 15.1
18	.0518	7.40	.8932	114 14	.3022	332 49	.5993	3.98	.493	7 36.9	22 11.3
19	.0545	7.26	.8906	113 54	.3017	331 51	.6129	4.10	.484	7 35.6	22 7.4
20	.0572	7.13	.8881	113 34	.3011	330 52	.6258	4.23	.475	7 34.3	22 3.5
21	.0600	— 6.99	0.8856	113 14	1.3006	329 54	0.6383	—4.35	—0.466	7 32.9	21 59.6
22	.0627	6.86	.8830	112 54	.3000	328 55	.6562	4.47	.457	7 31.6	21 55.7
23	.0655	6.73	.8805	112 34	.2994	327 56	.6617	4.59	.449	7 30.3	21 51.7
24	.0682	6.59	.8779	112 14	.2988	326 57	.6728	4.71	.440	7 28.9	21 47.8
25	.0709	6.46	.8754	111 54	.2982	325 58	.6835	4.82	.431	7 27.6	21 43.9
26	.0737	— 6.33	0.8728	111 34	1.2976	324 58	0.6937	—4.94	—0.422	7 26.3	21 39.9
27	.0764	6.21	.8703	111 15	.2969	323 59	.7036	5.05	.414	7 25.0	21 35.9
28	.0791	6.08	.8678	110 55	.2963	322 59	.7131	5.16	.405	7 23.7	21 31.9
29	.0819	5.96	.8652	110 36	.2956	322 0	.7223	5.28	.397	7 22.4	21 28.0
30	.0846	5.83	.8627	110 16	.2950	321 0	.7312	5.39	.389	7 21.1	21 24.0
31	.0874	— 5.71	0.8602	109 57	1.2943	320 0	0.7398	—5.49	—0.381	7 19.8	21 20.0
Feb. 1	.0901	5.59	.8577	109 37	.2937	319 0	.7481	5.60	.373	7 18.5	21 16.0
2	.0928	5.47	.8552	109 18	.2930	318 0	.7569	5.70	.365	7 17.2	21 12.0
3	.0956	5.36	.8527	108 59	.2923	316 59	.7637	5.80	.357	7 15.9	21 7.9
4	.0983	5.24	.8502	108 40	.2917	315 58	.7711	5.90	.349	7 14.7	21 3.9
5	.1010	— 5.12	0.8477	108 21	1.2910	314 57	0.7783	—6.00	—0.341	7 13.4	20 59.8
6	.1038	5.01	.8453	108 2	.2903	313 56	.7852	6.10	.334	7 12.1	20 55.7
7	.1065	4.90	.8429	107 43	.2897	312 55	.7918	6.19	.327	7 10.9	20 51.6
8	.1093	4.79	.8404	107 24	.2890	311 53	.7983	6.28	.319	7 9.6	20 47.5
9	.1120	4.68	.8381	107 5	.2884	310 52	.8044	6.37	.312	7 8.3	20 43.4
10	.1147	— 4.57	0.8357	106 47	1.2877	309 50	0.8104	—6.46	—0.305	7 7.1	20 39.3
11	.1175	4.47	.8333	106 28	.2871	308 48	.8162	6.55	.298	7 5.9	20 35.2
12	.1202	4.36	.8310	106 10	.2864	307 46	.8217	6.63	.291	7 4.7	20 31.1
13	.1230	4.26	.8287	105 51	.2858	306 44	.8271	6.71	.284	7 3.4	20 26.9
14	.1257	4.16	.8264	105 33	.2852	305 42	.8322	6.80	.277	7 2.2	20 22.8
15	.1284	— 4.06	0.8242	105 14	1.2846	304 39	0.8372	—6.87	—0.271	7 0.9	20 18.6
16	.1312	3.96	.8220	104 56	.2839	303 36	.8419	6.95	.264	6 59.7	20 14.4
17	.1339	3.86	.8198	104 37	.2833	302 33	.8465	7.02	.257	6 58.5	20 10.2
18	.1366	3.77	.8176	104 19	.2827	301 30	.8509	7.09	.251	6 57.3	20 6.0
19	.1394	3.67	.8155	104 1	.2821	300 27	.8551	7.16	.245	6 56.1	20 1.8
20	.1421	— 3.58	0.8134	103 43	1.2816	299 24	0.8591	—7.23	—0.239	6 54.9	19 57.6
21	.1449	3.48	.8114	103 25	.2810	298 21	.8629	7.29	.232	6 53.7	19 53.4
22	.1476	3.39	.8093	103 7	.2805	297 17	.8666	7.35	.226	6 52.5	19 49.1
23	.1503	3.30	.8074	102 49	.2800	296 14	.8701	7.41	.220	6 51.3	19 44.9
24	.1531	3.21	.8054	102 31	.2794	295 10	.8735	7.47	.214	6 50.1	19 40.7
25	.1558	— 3.12	0.8035	102 13	1.2789	294 6	0.8767	—7.53	—0.208	6 48.9	19 36.4
26	.1585	3.04	.8017	101 55	.2785	293 2	.8798	7.58	.203	6 47.7	19 32.1
27	.1613	2.95	.7999	101 37	.2780	291 58	.8827	7.63	.197	6 46.5	19 27.9
28	.1640	2.86	.7981	101 19	.2775	290 54	.8854	7.68	.191	6 45.3	19 23.6
29	0.1668	— 2.78	0.7964	101 1	1.2771	289 49	0.8880	—7.73	—0.185	6 44.1	19 19.3

 $f = 46'' .0819 \text{ A} + \text{E}.$



## FOR WASHINGTON MEAN MIDNIGHT.

### CONSTANTS FOR FACILITATING THE REDUCTION OF THE FIXED STARS

1869.	$\tau$ .	$f$ .	Log $g$ .	G.	Log $h$ .	H.	Log $i$ .	$i$ .	$f$ .	G.	H.
Mar. 1	0.1668	— 2.78	0.7964	101° 1'	1.2771	289° 49'	0.8880	—7.73	—0.185	<sup>h</sup> 44.1	<sup>h</sup> 19.3
2	.1695	2.70	.7947	100 43	.2767	288 45	.8904	7.77	.180	6 42.9	19 15.0
3	.1722	2.62	.7931	100 25	.2763	287 40	.8927	7.81	.175	6 41.7	19 10.7
4	.1750	2.53	.7915	100 7	.2760	286 36	.8948	7.85	.169	6 40.5	19 6.4
5	.1777	2.45	.7900	99 49	.2756	285 31	.8968	7.88	.163	6 39.3	19 2.1
6	.1804	— 2.37	0.7885	99 32	1.2753	284 26	0.8987	—7.92	—0.158	6 38.1	18 57.8
7	.1832	2.29	.7871	99 14	.2750	283 22	.9004	7.95	.153	6 36.9	18 53.5
8	.1859	2.21	.7857	98 56	.2747	282 17	.9020	7.98	.147	6 35.7	18 49.1
9	.1887	2.13	.7844	98 38	.2744	281 12	.9035	8.01	.142	6 34.5	18 44.8
10	.1914	2.05	.7831	98 20	.2742	280 7	.9048	8.03	.137	6 33.3	18 40.5
11	.1941	— 1.98	0.7819	98 2	1.2740	279 2	0.9059	—8.05	—0.132	6 32.1	18 36.1
12	.1969	1.90	.7807	97 44	.2738	277 57	.9070	8.07	.127	6 30.9	18 31.8
13	.1996	1.82	.7796	97 25	.2736	276 52	.9079	8.09	.121	6 29.7	18 27.5
14	.2024	1.74	.7786	97 7	.2735	275 47	.9087	8.10	.116	6 28.5	18 23.1
15	.2051	1.67	.7776	96 49	.2733	274 42	.9093	8.12	.112	6 27.3	18 18.8
16	.2078	— 1.59	0.7767	96 30	1.2732	273 37	0.9098	—8.12	—0.106	6 26.0	18 14.5
17	.2106	1.52	.7758	96 12	.2732	272 32	.9101	8.13	.101	6 24.8	18 10.1
18	.2133	1.44	.7750	95 54	.2731	271 27	.9104	8.14	.096	6 23.6	18 5.8
19	.2160	1.36	.7743	95 35	.2731	270 22	.9105	8.14	.091	6 22.3	18 1.5
20	.2188	1.29	.7736	95 16	.2731	269 17	.9105	8.14	.086	6 21.1	17 57.2
21	.2215	— 1.21	0.7730	94 57	1.2732	268 13	0.9103	—8.13	—0.081	6 19.8	17 52.9
22	.2243	1.14	.7724	94 38	.2732	267 8	.9101	8.13	.076	6 18.5	17 48.5
23	.2270	1.06	.7719	94 19	.2733	266 3	.9097	8.12	.071	6 17.3	17 44.2
24	.2297	0.98	.7715	94 0	.2734	264 59	.9091	8.11	.066	6 16.0	17 39.9
25	.2325	0.91	.7711	93 40	.2735	263 54	.9084	8.10	.061	6 14.7	17 35.6
26	.2352	— 0.83	0.7707	93 21	1.2737	262 50	0.9076	—8.08	—0.055	6 13.4	17 31.3
27	.2379	0.75	.7705	93 2	.2738	261 45	.9067	8.07	.050	6 12.1	17 27.0
28	.2407	0.68	.7703	92 42	.2740	260 41	.9057	8.05	.045	6 10.8	17 22.7
29	.2434	0.60	.7701	92 22	.2742	259 36	.9045	8.02	.040	6 9.5	17 18.4
30	.2462	0.52	.7700	92 2	.2745	258 32	.9032	8.00	.035	6 8.1	17 14.1
31	.2489	— 0.44	0.7700	91 42	1.2747	257 28	0.9017	—7.98	—0.029	6 6.8	17 9.9
Apr. 1	.2516	0.36	.7700	91 22	.2750	256 24	.9001	7.94	.024	6 5.5	17 5.6
2	.2544	0.28	.7701	91 2	.2753	255 20	.8984	7.92	.019	6 4.1	17 1.3
3	.2571	0.20	.7702	90 41	.2757	254 17	.8966	7.88	.013	6 2.7	16 57.1
4	.2598	0.12	.7704	90 21	.2760	253 13	.8945	7.84	.008	6 1.4	16 52.9
5	.2626	— 0.04	0.7707	90 0	1.2764	252 10	0.8924	—7.80	—0.003	6 0.0	16 48.7
6	.2653	+ 0.05	.7710	89 39	.2768	251 6	.8901	7.76	+0.003	5 58.6	16 44.4
7	.2681	0.13	.7713	89 18	.2772	250 3	.8877	7.72	.009	5 57.2	16 40.2
8	.2708	0.22	.7718	88 57	.2776	249 0	.8852	7.68	.015	5 55.8	16 36.0
9	.2735	0.30	.7722	88 35	.2781	247 58	.8825	7.63	.020	5 54.3	16 31.9
10	.2763	+ 0.39	0.7727	88 14	1.2785	246 55	0.8797	—7.58	+0.026	5 52.9	16 27.7
11	.2790	0.47	.7733	87 52	.2789	245 53	.8767	7.53	.031	5 51.5	16 23.5
12	.2818	0.56	.7739	87 30	.2794	244 51	.8736	7.48	.037	5 50.0	16 19.4
13	.2845	0.65	.7746	87 7	.2799	243 49	.8703	7.42	.043	5 48.5	16 15.3
14	.2872	0.74	.7753	86 45	.2804	242 47	.8669	7.36	.049	5 47.0	16 11.1
15	.2900	+ 0.83	0.7761	86 22	1.2810	241 45	0.8633	—7.30	+0.055	5 45.5	16 7.0
16	.2927	0.92	.7769	86 0	.2815	240 43	.8596	7.24	.061	5 44.0	16 2.9
17	.2954	1.01	.7778	85 37	.2821	239 42	.8557	7.18	.067	5 42.5	15 58.8
18	.2982	1.11	.7787	85 14	.2826	238 41	.8516	7.11	.074	5 40.9	15 54.7
19	.3009	1.20	.7796	84 51	.2832	237 40	.8474	7.04	.080	5 39.4	15 50.7
20	.3037	+ 1.30	0.7806	84 28	1.2838	236 39	0.8430	—6.97	+0.087	5 37.9	15 46.6
21	.3064	1.40	.7816	84 5	.2844	235 38	.8385	6.89	.093	5 36.3	15 42.6
22	.3091	1.49	.7827	83 41	.2850	234 38	.8338	6.82	.099	5 34.7	15 38.5
23	.3119	1.59	.7838	83 17	.2856	233 38	.8289	6.74	.106	5 33.1	15 34.5
24	.3146	1.70	.7850	82 53	.2862	232 38	.8238	6.66	.113	5 31.5	15 30.5
25	.3173	+ 1.80	0.7862	82 29	1.2868	231 38	0.8185	—6.58	+0.120	5 29.9	15 26.5
26	.3201	1.90	.7874	82 5	.2874	230 38	.8131	6.50	.127	5 28.3	15 22.6
27	.3228	2.01	.7887	81 41	.2880	229 39	.8075	6.42	.134	5 26.7	15 18.6
28	.3256	2.11	.7900	81 16	.2887	228 40	.8016	6.33	.141	5 25.1	15 14.7
29	.3283	2.22	.7913	80 51	.2893	227 41	.7956	6.25	.148	5 23.4	15 10.7
30	.3310	+ 2.33	0.7926	80 26	1.2899	226 42	0.7893	—6.16	+0.155	5 21.7	15 6.8
31	.3338	+ 2.44	0.7940	80 1	1.2906	225 43	0.7829	—6.07	+0.163	5 20.1	15 2.9

## FOR WASHINGTON MEAN MIDNIGHT.

## CONSTANTS FOR FACILITATING THE REDUCTION OF THE FIXED STARS.

1869.	$\tau$ .	$f$ .	Log $g$ .	G.	Log $h$ .	H.	Log $i$ .	$i$ .	$f$ .	G.	H.
May 1	0.3338	+ 2.44	0.7940	89° 1'	1.2906	225° 43'	0.7829	-6.07	+0.163	5 20.1	15 2.9
2	.3365	2.55	.7955	79 26	.2912	224 45	.7762	5.97	.170	5 18.4	14 59.0
3	.3392	2.66	.7969	79 11	.2919	223 47	.7693	5.88	.177	5 16.7	14 55.1
4	.3420	2.78	.7984	78 45	.2925	222 49	.7622	5.79	.185	5 15.0	14 51.3
5	.3447	2.89	.7999	78 20	.2932	221 51	.7548	5.69	.193	5 13.3	14 47.4
6	.3475	+ 3.01	0.8014	77 54	1.2938	220 53	0.7472	-5.59	+0.201	5 11.6	14 43.5
7	.3502	3.13	.8029	77 29	.2944	219 56	.7393	5.48	.209	5 9.9	14 39.7
8	.3529	3.25	.8045	77 3	.2950	218 59	.7311	5.38	.217	5 8.2	14 35.9
9	.3557	3.37	.8061	76 37	.2957	218 2	.7225	5.28	.225	5 6.5	14 32.1
10	.3584	3.49	.8077	76 11	.2963	217 5	.7139	5.18	.233	5 4.7	14 28.3
11	.3612	+ 3.61	0.8093	75 44	1.2969	216 8	0.7049	-5.07	+0.241	5 2.9	14 24.5
12	.3639	3.74	.8110	75 18	.2975	215 12	.6956	4.96	.249	5 1.2	14 20.8
13	.3666	3.86	.8127	74 51	.2980	214 16	.6859	4.85	.257	4 59.4	14 17.1
14	.3694	3.99	.8144	74 25	.2986	213 19	.6759	4.74	.266	4 57.7	14 13.3
15	.3721	4.12	.8161	73 58	.2992	212 24	.6655	4.63	.275	4 55.9	14 9.6
16	.3748	+ 4.25	0.8178	73 31	1.2998	211 28	0.6548	-4.52	+0.283	4 54.1	14 5.9
17	.3776	4.38	.8195	73 4	.3003	210 32	.6437	4.40	.292	4 52.3	14 2.1
18	.3803	4.51	.8212	72 38	.3009	209 37	.6322	4.29	.301	4 50.5	13 58.5
19	.3831	4.64	.8230	72 11	.3014	208 42	.6201	4.17	.309	4 48.7	13 54.8
20	.3858	4.77	.8248	71 44	.3020	207 46	.6077	4.05	.318	4 46.9	13 51.1
21	.3885	+ 4.91	0.8265	71 16	1.3025	206 51	0.5948	-3.93	+0.327	4 45.1	13 47.4
22	.3913	5.04	.8283	70 49	.3030	205 57	.5813	3.81	.336	4 43.3	13 43.8
23	.3940	5.18	.8301	70 22	.3034	205 2	.5672	3.69	.345	4 41.5	13 40.1
24	.3967	5.32	.8319	69 54	.3039	204 7	.5526	3.57	.355	4 39.6	13 36.5
25	.3995	5.46	.8337	69 27	.3044	203 13	.5374	3.45	.364	4 37.8	13 32.9
26	.4022	+ 5.60	0.8355	69 0	1.3048	202 18	0.5215	-3.32	+0.373	4 26.0	13 29.2
27	.4050	5.74	.8373	68 33	.3052	201 24	.5049	3.20	.383	4 24.2	13 25.6
28	.4077	5.88	.8391	68 5	.3056	200 30	.4874	3.07	.392	4 22.3	13 22.0
29	.4104	6.03	.8410	67 38	.3060	199 36	.4691	2.94	.402	4 20.5	13 18.4
30	.4132	6.17	.8428	67 10	.3064	198 43	.4499	2.82	.411	4 28.7	13 14.9
31	.4159	+ 6.31	0.8446	66 42	1.3068	197 49	0.4298	-2.69	+0.421	4 26.8	13 11.3
June 1	.4186	6.46	.8464	66 15	.3071	196 55	.4085	2.56	.431	4 25.0	13 7.7
2	.4214	6.61	.8483	65 47	.3074	196 2	.3859	2.43	.441	4 23.1	13 4.1
3	.4241	6.75	.8501	65 20	.3078	195 8	.3621	2.30	.450	4 21.3	13 0.5
4	.4269	6.90	.8519	64 52	.3081	194 15	.3367	2.17	.460	4 19.5	12 57.0
5	.4296	+ 7.05	0.8537	64 25	1.3084	193 22	0.3096	-2.04	+0.470	4 17.7	12 53.5
6	.4323	7.20	.8556	63 57	.3087	192 29	.2807	1.91	.480	4 15.8	12 49.9
7	.4351	7.35	.8574	63 30	.3089	191 35	.2494	1.78	.490	4 14.0	12 46.3
8	.4378	7.50	.8592	63 2	.3092	190 42	.2157	1.64	.500	4 12.1	12 42.8
9	.4405	7.65	.8610	62 34	.3094	189 50	.1790	1.51	.510	4 10.3	12 39.3
10	.4433	+ 7.80	0.8628	62 7	1.3096	188 57	0.1387	-1.38	+0.520	4 8.5	12 35.8
11	.4460	7.95	.8646	61 39	.3098	188 4	.0942	1.24	.530	4 6.6	12 32.3
12	.4488	8.10	.8664	61 12	.3100	187 11	0.0446	1.11	.540	4 4.8	12 28.7
13	.4515	8.25	.8682	60 44	.3101	186 18	9.9884	0.97	.550	4 2.9	12 25.2
14	.4542	8.41	.8700	60 17	.3102	185 26	.9236	0.84	.561	4 1.1	12 21.7
15	.4570	+ 8.56	0.8717	59 50	1.3103	184 33	9.8474	-0.70	+0.571	3 59.3	12 18.2
16	.4597	8.71	.8735	59 22	.3104	183 41	.7550	0.57	.581	3 57.5	12 14.7
17	.4625	8.86	.8753	58 55	.3105	182 48	.6370	0.43	.591	3 55.7	12 11.2
18	.4652	9.02	.8770	58 27	.3106	181 55	.4744	0.30	.601	3 53.8	12 7.7
19	.4679	9.17	.8788	58 0	.3106	181 3	9.2114	0.16	.611	3 52.0	12 4.2
20	.4707	+ 9.33	0.8805	57 33	1.3106	180 10	8.4298	-0.03	+0.622	3 50.2	12 0.7
21	.4734	9.48	.8822	57 6	.3106	179 18	9.0353	+0.11	.632	3 48.4	11 57.2
22	.4761	9.63	.8839	56 39	.3106	178 25	.3864	0.24	.642	3 46.6	11 53.7
23	.4789	9.79	.8856	56 12	.3105	177 33	.5789	0.38	.653	3 44.8	11 50.2
24	.4816	9.94	.8873	55 46	.3105	176 41	.7115	0.51	.663	3 43.1	11 46.7
25	.4844	+10.09	0.8890	55 19	1.3104	175 48	9.8126	+0.65	+0.673	3 41.3	11 43.2
26	.4871	10.24	.8907	54 52	.3103	174 56	.8946	0.78	.683	3 39.5	11 39.7
27	.4898	10.40	.8924	54 25	.3102	174 3	9.9633	0.92	.693	3 37.7	11 36.2
28	.4926	10.55	.8940	53 59	.3100	173 10	0.0226	1.05	.703	3 35.9	11 32.7
29	.4953	10.70	.8957	53 32	.3099	172 18	.0747	1.19	.713	3 34.1	11 29.2
30	.4980	+10.85	0.8973	53 6	1.3097	171 25	0.1210	+1.32	+0.723	3 32.4	11 25.7
31	.5008	+11.00	0.8989	52 40	1.3095	170 32	0.1627	+1.45	+0.733	3 30.7	11 22.1

## FOR WASHINGTON MEAN MIDNIGHT.

### CONSTANTS FOR FACILITATING THE REDUCTION OF THE FIXED STARS.

1869.	$\tau$ .	$f$ .	Log $g$ .	G.	Log $h$ .	H.	Log $i$ .	$i$ .	$f$ .	G.	H.
										<sup>h</sup> <sup>m</sup>	<sup>h</sup> <sup>m</sup>
July 1	0.5008	+11.00	0.8989	52° 40'	1.3095	170° 32'	0.1627	+1.45	+0.733	3 30.7	11 22.1
2	.5035	11.16	.9005	52 14	.3093	169 40	.2008	1.58	.744	3 28.9	11 18.7
3	.5063	11.31	.9021	51 48	.3091	168 47	.2356	1.72	.754	3 27.2	11 15.1
4	.5090	11.46	.9037	51 22	.3088	167 54	.2677	1.85	.764	3 25.5	11 11.6
5	.5117	11.60	.9052	50 56	.3086	167 1	.2976	1.98	.774	3 23.8	11 8.1
6	.5145	+11.75	0.9068	50 31	1.3083	166 8	0.3254	+2.11	+0.783	3 22.1	11 4.5
7	.5172	11.90	.9083	50 5	.3080	165 15	.3513	2.24	.793	3 20.3	11 1.0
8	.5199	12.05	.9099	49 40	.3077	164 22	.3757	2.38	.803	3 18.6	10 57.5
9	.5227	12.19	.9114	49 15	.3073	163 28	.3987	2.50	.813	3 17.0	10 53.9
10	.5254	12.34	.9129	48 50	.3070	162 35	.4204	2.63	.823	3 15.3	10 50.3
11	.5282	+12.49	0.9144	48 25	1.3066	161 42	0.4411	+2.76	+0.832	3 13.7	10 46.8
12	.5309	12.63	.9158	48 0	.3062	160 48	.4606	2.89	.842	3 12.0	10 43.2
13	.5336	12.77	.9173	47 36	.3058	159 54	.4792	3.01	.851	3 10.4	10 39.6
14	.5364	12.92	.9188	47 11	.3054	159 1	.4969	3.14	.861	3 8.7	10 36.1
15	.5391	13.06	.9202	46 47	.3050	158 7	.5138	3.26	.871	3 7.1	10 32.5
16	.5419	+13.20	0.9216	46 23	1.3046	157 13	0.5300	+3.39	+0.880	3 5.5	10 28.9
17	.5446	13.34	.9230	45 58	.3041	156 19	.5455	3.51	.889	3 3.9	10 25.3
18	.5473	13.48	.9244	45 34	.3037	155 25	.5602	3.63	.899	3 2.3	10 21.7
19	.5501	13.62	.9258	45 11	.3032	154 30	.5744	3.75	.908	3 0.7	10 18.0
20	.5528	13.75	.9272	44 48	.3027	153 36	.5881	3.87	.917	2 59.2	10 14.4
21	.5555	+13.89	0.9285	44 25	1.3022	152 41	0.6012	+3.99	+0.926	2 57.7	10 10.7
22	.5583	14.02	.9299	44 2	.3017	151 47	.6138	4.11	.935	2 56.1	10 7.1
23	.5610	14.16	.9312	43 39	.3011	150 52	.6260	4.23	.944	2 54.6	10 3.5
24	.5638	14.29	.9325	43 16	.3006	149 57	.6377	4.34	.953	2 53.1	9 59.8
25	.5665	14.42	.9338	42 53	.3001	149 2	.6489	4.46	.961	2 51.5	9 56.1
26	.5692	+14.55	0.9351	42 31	1.2995	148 7	0.6599	+4.57	+0.970	2 50.0	9 52.5
27	.5720	14.68	.9364	42 9	.2989	147 11	.6703	4.68	.979	2 48.6	9 48.7
28	.5747	14.81	.9376	41 47	.2984	146 16	.6805	4.79	.987	2 47.1	9 45.1
29	.5774	14.93	.9389	41 25	.2978	145 20	.6903	4.90	0.995	2 45.7	9 41.3
30	.5802	15.06	.9401	41 3	.2972	144 24	.6997	5.01	1.004	2 44.2	9 37.6
31	.5829	+15.19	0.9414	40 42	1.2966	143 28	0.7088	+5.11	+1.013	2 42.8	9 33.9
Aug. 1	.5857	15.31	.9426	40 21	.2960	142 31	.7176	5.22	.021	2 41.4	9 30.1
2	.5884	15.43	.9438	40 0	.2954	141 35	.7262	5.32	.029	2 40.0	9 26.3
3	.5911	15.55	.9450	39 40	.2948	140 38	.7344	5.43	.037	2 38.7	9 22.5
4	.5939	15.67	.9462	39 19	.2941	139 41	.7424	5.53	.045	2 37.3	9 18.7
5	.5966	+15.79	0.9473	38 59	1.2935	138 44	0.7501	+5.62	+1.053	2 35.9	9 14.9
6	.5993	15.90	.9485	38 39	.2929	137 47	.7576	5.72	.060	2 34.6	9 11.1
7	.6021	16.02	.9496	38 19	.2922	136 50	.7648	5.82	.068	2 33.3	9 7.3
8	.6048	16.13	.9508	37 59	.2916	135 52	.7718	5.91	.075	2 31.9	9 3.5
9	.6076	16.25	.9519	37 40	.2910	134 54	.7786	6.01	.083	2 30.7	8 59.6
10	.6103	+16.36	0.9531	37 22	1.2904	133 56	0.7851	+6.10	+1.091	2 29.5	8 55.7
11	.6130	16.47	.9542	37 3	.2897	132 58	.7915	6.19	.098	2 28.2	8 51.9
12	.6158	16.58	.9553	36 45	.2891	132 0	.7976	6.28	.105	2 27.0	8 48.0
13	.6185	16.69	.9564	36 26	.2885	131 2	.8035	6.36	.113	2 25.7	8 44.1
14	.6213	16.79	.9575	36 8	.2879	130 3	.8092	6.45	.120	2 24.5	8 40.2
15	.6240	+16.90	0.9586	35 50	1.2873	129 4	0.8147	+6.53	+1.127	2 23.3	8 36.3
16	.6267	17.00	.9596	35 33	.2867	128 5	.8201	6.61	.133	2 22.2	8 32.3
17	.6295	17.10	.9607	35 15	.2861	127 6	.8252	6.69	.140	2 21.0	8 28.4
18	.6322	17.21	.9618	34 58	.2854	126 6	.8302	6.76	.147	2 19.9	8 24.4
19	.6349	17.31	.9628	34 42	.2848	125 7	.8350	6.84	.154	2 18.8	8 20.5
20	.6377	+17.41	0.9638	34 25	1.2843	124 7	0.8396	+6.91	+1.161	2 17.7	8 16.5
21	.6404	17.50	.9649	34 9	.2837	123 7	.8441	6.98	.167	2 16.6	8 12.5
22	.6432	17.60	.9659	33 53	.2831	122 7	.8484	7.05	.173	2 15.6	8 8.5
23	.6459	17.70	.9670	33 37	.2825	121 6	.8525	7.12	.180	2 14.5	8 4.4
24	.6486	17.79	.9680	33 22	.2820	120 6	.8565	7.19	.186	2 13.5	8 0.4
25	.6514	+17.89	0.9691	33 7	1.2814	119 5	0.8603	+7.25	+1.193	2 12.5	7 56.3
26	.6541	17.98	.9701	32 52	.2809	118 4	.8639	7.31	.199	2 11.5	7 52.3
27	.6568	18.07	.9711	32 38	.2804	117 3	.8675	7.37	.205	2 10.5	7 48.2
28	.6596	18.16	.9721	32 23	.2799	116 3	.8708	7.43	.211	2 9.6	7 44.1
29	.6623	18.25	.9731	32 9	.2794	115 0	.8740	7.48	.217	2 8.6	7 40.0
30	.6651	+18.34	0.9742	31 56	1.2789	113 59	0.8771	+7.54	+1.223	2 7.7	7 35.9
31	0.6678	+18.43	0.9752	31 42	1.2784	112 57	0.8800	+7.59	+1.229	2 6.8	7 31.8

## FOR WASHINGTON MEAN MIDNIGHT.

## CONSTANTS FOR FACILITATING THE REDUCTION OF THE FIXED STARS.

1869.	$\tau$ .	$f$ .	Log $g$ .	G.	Log $h$ .	H.	Log $i$ .	$i$ .	$f$ .	G.	H.
										<sup>h</sup> <sup>m</sup>	<sup>h</sup> <sup>m</sup>
Sept. 1	0.6705	+18.52	0.9762	31° 29'	1.2780	111° 56'	0.8828	+7.64	+1.235	2 5.9	7 27.7
2	.6733	18.60	.9772	31 16	.2775	110 54	.8854	7.68	.240	2 5.1	7 23.6
3	.6760	18.69	.9783	31 3	.2771	109 51	.8879	7.73	.246	2 4.2	7 19.4
4	.6787	18.77	.9793	30 51	.2767	108 49	.8903	7.77	.251	2 3.4	7 15.3
5	.6815	18.86	.9803	30 39	.2763	107 47	.8925	7.81	.257	2 2.6	7 11.1
6	.6842	+18.94	0.9814	30 27	1.2760	106 44	0.8946	+7.84	+1.263	2 1.8	7 6.9
7	.6870	19.02	.9824	30 15	.2756	105 41	.8966	7.88	.268	2 1.0	7 2.7
8	.6897	19.11	.9834	30 4	.2753	104 38	.8984	7.91	.274	2 0.3	6 58.5
9	.6924	19.19	.9845	29 53	.2750	103 35	.9001	7.94	.279	1 59.5	6 54.3
10	.6952	19.27	.9855	29 42	.2747	102 32	.9017	7.97	.285	1 58.8	6 50.1
11	.6979	+19.35	0.9866	29 32	1.2745	101 29	0.9031	+8.00	+1.290	1 58.1	6 45.9
12	.7007	19.43	.9877	29 22	.2743	100 26	.9044	8.02	.295	1 57.5	6 41.7
13	.7034	19.51	.9887	29 12	.2740	99 22	.9056	8.05	.301	1 56.8	6 37.5
14	.7061	19.59	.9898	29 2	.2738	98 18	.9067	8.07	.306	1 56.1	6 33.2
15	.7089	19.66	.9909	28 53	.2737	97 15	.9076	8.08	.311	1 55.5	6 29.0
16	.7116	+19.74	0.9920	28 44	1.2735	96 11	0.9084	+8.10	+1.316	1 54.9	6 24.7
17	.7143	19.82	.9931	28 35	.2734	95 7	.9091	8.11	.321	1 54.3	6 20.5
18	.7171	19.90	.9942	28 26	.2733	94 3	.9096	8.12	.327	1 53.7	6 16.2
19	.7198	19.98	.9953	28 17	.2732	92 59	.9100	8.13	.332	1 53.1	6 11.9
20	.7226	20.06	.9965	28 9	.2732	91 55	.9103	8.13	.337	1 52.6	6 7.7
21	.7253	+20.13	0.9976	28 1	1.2731	90 51	0.9105	+8.14	+1.342	1 52.1	6 3.4
22	.7280	20.21	.9988	27 53	.2731	89 47	.9105	8.14	.347	1 51.5	5 59.1
23	.7308	20.29	0.9999	27 46	.2731	88 43	.9104	8.13	.353	1 51.0	5 54.9
24	.7335	20.37	1.0011	27 39	.2732	87 39	.9102	8.13	.358	1 50.6	5 50.6
25	.7362	20.45	.0023	27 32	.2733	86 35	.9099	8.13	.363	1 50.1	5 46.3
26	.7390	+20.52	1.0035	27 26	1.2733	85 30	0.9094	+8.12	+1.368	1 49.7	5 42.0
27	.7417	20.60	.0048	27 19	.2735	84 26	.9088	8.11	.373	1 49.3	5 37.7
28	.7445	20.68	.0060	27 12	.2736	83 22	.9081	8.09	.379	1 48.8	5 33.5
29	.7472	20.76	.0073	27 6	.2738	82 18	.9072	8.08	.384	1 48.4	5 29.2
30	.7499	20.84	.0086	27 0	.2739	81 13	.9062	8.06	.389	1 48.0	5 24.9
Oct. 1	.7527	+20.92	1.0098	26 54	1.2742	80 9	0.9051	+8.04	+1.395	1 47.6	5 20.6
2	.7554	21.00	.0111	26 49	.2744	79 5	.9039	8.02	.400	1 47.3	5 16.3
3	.7581	21.08	.0125	26 43	.2746	78 1	.9025	7.99	.405	1 46.9	5 12.1
4	.7609	21.16	.0138	26 38	.2749	76 57	.9009	7.96	.411	1 46.5	5 7.8
5	.7636	21.24	.0152	26 33	.2752	75 53	.8993	7.93	.416	1 46.2	5 3.5
6	.7664	+21.33	1.0165	26 28	1.2755	74 49	0.8975	+7.90	+1.422	1 45.9	4 59.3
7	.7691	21.41	.0179	26 24	.2759	73 46	.8955	7.86	.427	1 45.6	4 55.1
8	.7718	21.49	.0194	26 19	.2763	72 41	.8935	7.82	.433	1 45.3	4 50.7
9	.7746	21.58	.0208	26 15	.2766	71 37	.8913	7.78	.439	1 45.0	4 46.5
10	.7773	21.66	.0223	26 10	.2770	70 34	.8889	7.74	.444	1 44.7	4 42.3
11	.7801	+21.75	1.0237	26 6	1.2774	69 30	0.8864	+7.70	+1.450	1 44.4	4 38.0
12	.7828	21.84	.0252	26 2	.2779	68 27	.8838	7.65	.456	1 44.1	4 33.8
13	.7855	21.93	.0267	25 58	.2783	67 23	.8810	7.60	.462	1 43.9	4 29.5
14	.7883	22.02	.0282	25 54	.2788	66 20	.8780	7.55	.468	1 43.6	4 25.3
15	.7910	22.11	.0298	25 50	.2793	65 17	.8749	7.50	.474	1 43.3	4 21.1
16	.7937	+22.20	1.0314	25 47	1.2798	64 14	0.8717	+7.44	+1.480	1 43.1	4 16.9
17	.7965	22.29	.0330	25 43	.2803	63 11	.8683	7.38	.486	1 42.9	4 12.7
18	.7992	22.38	.0346	25 40	.2808	62 8	.8647	7.33	.492	1 42.7	4 8.5
19	.8020	22.48	.0362	25 37	.2813	61 5	.8609	7.26	.499	1 42.5	4 4.3
20	.8047	22.57	.0378	25 33	.2819	60 3	.8570	7.19	.505	1 42.2	4 0.2
21	.8074	+22.67	1.0395	25 30	1.2825	59 0	0.8529	+7.13	+1.511	1 42.0	3 56.0
22	.8102	22.77	.0412	25 27	.2830	57 58	.8487	7.06	.518	1 41.8	3 51.9
23	.8129	22.87	.0429	25 24	.2836	56 56	.8443	6.99	.525	1 41.6	3 47.7
24	.8156	22.97	.0446	25 21	.2842	55 54	.8397	6.91	.531	1 41.4	3 43.6
25	.8184	23.07	.0463	25 18	.2848	54 52	.8348	6.84	.538	1 41.2	3 39.5
26	.8211	+23.17	1.0481	25 15	1.2854	53 50	0.8299	+6.76	+1.545	1 41.0	3 35.4
27	.8239	23.28	.0499	25 12	.2861	52 49	.8247	6.68	.552	1 40.8	3 31.3
28	.8266	23.38	.0517	25 9	.2867	51 47	.8193	6.60	.559	1 40.6	3 27.2
29	.8293	23.49	.0535	25 6	.2873	50 46	.8137	6.51	.566	1 40.4	3 23.1
30	.8321	23.60	.0553	25 3	.2880	49 44	.8080	6.43	.573	1 40.2	3 19.0
31	.8348	+23.71	1.0572	25 0	1.2886	48 43	0.8020	+6.34	+1.581	1 40.0	3 14.9
32	0.8375	+23.82	1.0590	24 57	1.2893	47 42	0.7957	+6.25	+1.588	1 39.8	3 10.8

## FOR WASHINGTON MEAN MIDNIGHT.

### CONSTANTS FOR FACILITATING THE REDUCTION OF THE FIXED STARS.

1869.	$\tau$ .	$f$ .	Log $g$ .	$G$ .	Log $h$ .	$H$ .	Log $i$ .	$i$ .	$f$ .	$G$ .	$H$ .
Nov. 1	0.8375	+23.82	1.0590	24 57	1.2893	47 42	0.7957	+6.25	+1.588	<sup>h</sup> 39.8	<sup>h</sup> 3 10.8
2	.8403	23.94	.0609	24 54	.2809	46 42	.7893	6.16	.596	1 39.6	3 6.8
3	.8430	24.05	.0628	24 51	.2906	45 41	.7826	6.06	.603	1 39.4	3 2.7
4	.8458	24.17	.0647	24 48	.2912	44 41	.7756	5.97	.611	1 39.2	2 58.7
5	.8485	24.28	.0666	24 45	.2919	43 40	.7685	5.87	.619	1 39.0	2 54.7
6	.8512	+24.40	1.0686	24 42	1.2926	42 40	0.7610	+5.77	+1.627	1 38.8	2 50.7
7	.8540	24.52	.0705	24 38	.2932	41 40	.7533	5.67	.635	1 38.5	2 46.7
8	.8567	24.65	.0725	24 35	.2939	40 40	.7453	5.56	.643	1 38.3	2 42.7
9	.8594	24.77	.0745	24 32	.2945	39 40	.7370	5.46	.651	1 38.1	2 38.7
10	.8622	24.89	.0764	24 28	.2952	38 41	.7284	5.35	.659	1 37.9	2 34.7
11	.8649	+25.02	1.0784	24 25	1.2958	37 41	0.7195	+5.24	+1.668	1 37.7	2 30.8
12	.8677	25.15	.0805	24 21	.2965	36 42	.7103	5.13	.677	1 37.4	2 26.8
13	.8704	25.28	.0825	24 18	.2971	35 43	.7007	5.02	.685	1 37.2	2 22.9
14	.8731	25.41	.0845	24 14	.2977	34 44	.6908	4.91	.694	1 36.9	2 18.9
15	.8759	25.54	.0865	24 11	.2983	33 45	.6805	4.79	.703	1 36.7	2 15.0
16	.8786	+25.67	1.0886	24 7	1.2989	32 46	0.6698	+4.67	+1.712	1 36.5	2 11.1
17	.8814	25.81	.0907	24 3	.2995	31 48	.6587	4.56	.721	1 36.2	2 7.2
18	.8841	25.95	.0927	23 59	.3001	30 49	.6471	4.44	.730	1 35.9	2 3.3
19	.8868	26.08	.0948	23 54	.3007	29 51	.6351	4.32	.739	1 35.6	1 59.4
20	.8896	+26.22	.0968	23 50	.3012	28 53	.6226	4.19	.748	1 35.3	1 55.5
21	.8923	+26.36	1.0989	23 46	1.3018	27 55	0.6096	+4.07	+1.758	1 35.1	1 51.7
22	.8950	26.51	.1010	23 42	.3024	26 57	.5961	3.95	.767	1 34.8	1 47.8
23	.8978	26.65	.1031	23 37	.3029	26 0	.5820	3.82	.777	1 34.5	1 44.0
24	.9005	26.79	.1051	23 33	.3034	25 2	.5672	3.69	.786	1 34.2	1 40.1
25	.9033	26.94	.1072	23 28	.3039	24 4	.5518	3.56	.796	1 33.9	1 36.3
26	.9060	+27.08	1.1093	23 23	1.3044	23 7	0.5357	+3.43	+1.866	1 33.5	1 32.5
27	.9087	27.23	.1114	23 17	.3049	22 9	.5188	3.30	.815	1 33.2	1 28.6
28	.9115	27.38	.1135	23 12	.3053	21 12	.5011	3.17	.825	1 32.8	1 24.8
29	.9142	27.53	.1155	23 7	.3058	20 15	.4824	3.04	.835	1 32.5	1 21.0
30	.9169	27.68	.1176	23 1	.3062	19 18	.4628	2.90	.845	1 32.1	1 17.2
Dec. 1	.9197	+27.83	1.1197	22 56	1.3066	18 21	0.4421	+2.77	+1.855	1 31.7	1 13.4
2	.9224	27.99	.1218	22 51	.3070	17 24	.4202	2.63	.866	1 31.4	1 9.6
3	.9252	28.14	.1239	22 45	.3073	16 28	.3971	2.50	.876	1 31.0	1 5.9
4	.9279	28.30	.1260	22 39	.3077	15 31	.3724	2.36	.887	1 30.6	1 2.1
5	.9306	28.45	.1280	22 33	.3080	14 34	.3462	2.22	.897	1 30.2	0 58.3
6	.9334	+28.61	1.1301	22 27	1.3083	13 38	0.3180	+2.08	+1.908	1 29.8	0 54.5
7	.9361	28.77	.1321	22 21	.3086	12 41	.2877	1.94	.918	1 29.4	0 50.7
8	.9388	28.92	.1342	22 15	.3089	11 45	.2551	1.80	.928	1 29.0	0 47.0
9	.9416	29.08	.1362	22 8	.3092	10 48	.2197	1.66	.939	1 28.5	0 43.2
10	.9443	29.24	.1383	22 2	.3094	9 52	.1808	1.52	.949	1 28.1	0 39.5
11	.9471	+29.40	1.1403	21 55	1.3096	8 56	0.1380	+1.37	+1.960	1 27.7	0 35.7
12	.9498	29.56	.1423	21 48	.3098	8 0	.0904	1.23	.971	1 27.2	0 32.0
13	.9525	29.72	.1443	21 42	.3100	7 3	0.0367	1.09	.981	1 26.8	0 28.2
14	.9553	29.89	.1463	21 35	.3101	6 7	9.9755	0.94	1.992	1 26.3	0 24.5
15	.9580	30.05	.1483	21 28	.3103	5 11	.9036	0.80	2.003	1 25.9	0 20.7
16	.9608	+30.21	1.1503	21 21	1.3104	4 15	9.8175	+0.66	+2.014	1 25.4	0 17.0
17	.9635	30.37	.1522	21 13	.3105	3 19	.7100	0.51	.025	1 24.9	0 13.3
18	.9662	30.53	.1542	21 6	.3105	2 23	.5668	0.37	.036	1 24.4	0 9.5
19	.9690	30.70	.1561	20 58	.3106	1 27	9.3509	0.22	.047	1 23.9	0 5.8
20	.9717	30.86	.1580	20 51	.3106	0 31	8.8998	+0.08	.057	1 23.4	0 2.1
21	.9744	+31.02	1.1600	20 43	1.3106	359 35	8.8135	-0.06	+2.068	1 22.9	23 58.3
22	.9772	31.18	.1619	20 35	.3106	358 39	9.3222	0.21	.079	1 22.3	23 54.6
23	.9799	31.35	.1637	20 27	.3105	357 43	.5491	0.35	.090	1 21.8	23 50.9
24	.9827	31.51	.1656	20 20	.3104	356 46	.6977	0.50	.101	1 21.3	23 47.1
25	.9854	31.67	.1675	20 12	.3104	355 50	.8082	0.64	.112	1 20.8	23 43.3
26	.9881	+31.84	1.1693	20 4	1.3102	354 54	9.8963	-0.79	+2.123	1 20.3	23 39.6
27	.9909	32.00	.1711	19 55	.3101	353 58	9.9692	0.93	.133	1 19.7	23 35.9
28	.9936	32.16	.1729	19 47	.3100	353 2	0.0317	1.07	.144	1 19.1	23 32.1
29	.9963	32.32	.1747	19 39	.3098	352 5	.0858	1.22	.155	1 18.6	23 28.3
30	0.9991	32.48	.1765	19 30	.3097	351 9	.1340	1.36	.165	1 18.0	23 24.6
31	1.0018	+32.64	1.1783	19 22	1.3095	350 13	0.1773	-1.50	+2.176	1 17.5	23 20.9
32	1.0046	+32.80	1.1800	19 13	1.3093	349 16	0.2165	-1.65	+2.187	1 16.9	23 17.1

BESSEL'S FORMULÆ OF REDUCTION FOR THE FIXED STARS,

WITH DR. PETERS'S COEFFICIENTS, AND BESSEL'S NOTATION.

$$A = \tau - 0.34242 \sin \Omega + 0.00410 \sin 2 \Omega - 0.02519 \sin 2 \odot + 0.00294 \sin (\odot + 82^\circ 20').$$

$$B = -9''.2237 \cos \Omega + 0''.0896 \cos 2 \Omega - 0''.5507 \cos 2 \odot - 0''.0093 \cos (\odot + 280^\circ 41').$$

$$C = -20''.4451 \cos \omega \cos \odot.$$

$$D = -20''.4451 \sin \odot.$$

$$E = -0''.0470 \sin \Omega + 0''.0015 \sin 2 \Omega - 0''.0034 \sin 2 \odot.$$

$$a = 46''.0819 + 20''.0548 \sin a \tan \delta.$$

$$b = \cos a \tan \delta.$$

$$c = \cos a \sec \delta.$$

$$d = \sin a \sec \delta.$$

$$a' = 20''.0548 \cos a.$$

$$b' = -\sin a.$$

$$c' = \tan \omega \cos \delta - \sin a \sin \delta.$$

$$d' = \cos a \sin \delta.$$

$\mu$  = the annual proper motion in right ascension.

$\mu'$  = the annual proper motion in declination.

$\tau$  = the time reckoned from Jan. 0<sup>d</sup> — .407, when the sun's mean longitude was  $280^\circ$ , and expressed in fractional parts of a tropical year.

$\odot$  = the sun's true longitude.

$\Omega$  = the longitude of the moon's ascending node.

$\omega$  = the obliquity of the ecliptic.

$a$  = the star's mean right ascension for the beginning of the year.

$\delta$  = the star's mean declination for the beginning of the year.

$a'$  = the star's apparent right ascension at the time  $\tau$ .

$\delta'$  = the star's apparent declination at the time  $\tau$ .

$$a' - a = A a + B b + C c + D d + E + \tau \mu.$$

$$\delta' - \delta = A a' + B b' + C c' + D d' + \tau \mu'.$$

The following formulæ may also be used by putting

$$f = 46''.0819 A + E.$$

$$i = C \tan \omega.$$

$$g \cos G = 20''.0548 A.$$

$$h \sin H = C.$$

$$g \sin G = B$$

$$h \cos H = D.$$

$$a' - a = f + \tau \mu + g \sin (G + a) \tan \delta + h \sin (H + a) \sec \delta.$$

$$\delta' - \delta = \tau \mu' + g \cos (G + a) + h \cos (H + a) \sin \delta + i \cos \delta.$$

Table V. and VI. of the Appendix contain the following terms, which may be added to A and B, when great accuracy is required:

$$\begin{aligned} \Delta A = & -0.00405 \sin 2 \varrho + 0.00135 \sin (\varrho - \Gamma') + 0.00025 \sin (2 \odot - \Omega) \\ & + 0.00010 \sin 2 (\odot - \Gamma') - 0.00005 \sin 2 (\odot - \Omega) + 0.00009 \sin (2 \Gamma' - \Omega) \\ & + 0.00005 \cos \Gamma' + 0.00004 \sin 2 \Gamma' - 0.00011 \sin (3 \odot - \Gamma'). \end{aligned}$$

$$\begin{aligned} \Delta B = & -0''.0886 \cos 2 \varrho + 0''.0067 \cos (2 \odot - \Omega) + 0''.0024 \cos (2 \Gamma' - \Omega) \\ & - 0''.0023 \sin \Gamma' + 0''.0008 \cos 2 \Gamma' - 0''.0027 \cos (3 \odot - \Gamma'). \end{aligned}$$

In which—

$\varrho$  = the moon's mean longitude.

$\Gamma$  = the longitude of the sun's perigee.

$\Gamma'$  = the longitude of the moon's perigee.

Other terms, which became sensible for stars very near the pole, will be found on page 504.

MEAN PLACES FOR 1869.0. (Jan. 0—<sup>d</sup>407.)

Star's Name.	Magnitude.	Right Ascension.	An. Variation.	Declination.	An. Variation.
<i>α</i> Andromedæ . . . . .	2	<sup>h</sup> 0 <sup>m</sup> 1 37.207	+ 3.087	+28° 22' 2.51	+19.91
<i>γ</i> Pegasi ( <i>Algenib</i> ) . . . . .	3.2	0 6 29.535	3.083	+14 27 18.85	20.04
* <i>β</i> Hydri . . . . .	3	0 18 49.647	3.281	—77 59 34.65	20.25
<i>α</i> Cassiopeæ . . . . .	var.	0 33 5.318	3.363	+55 49 6.75	19.81
<i>β</i> Ceti . . . . .	2	0 37 0.727	3.014	—18 42 22.74	19.81
*21 Cassiopeæ . . . . .	6	0 37 2.549	+ 3.825	+74 16 15.38	+19.73
<i>ε</i> Piscium . . . . .	4	0 56 8.824	3.110	+ 7 11 2.89	19.46
* POLARIS . . . . .	2	1 10 56.290	19.941	+88 36 39.53	19.11
<i>θ</i> <sup>1</sup> Ceti . . . . .	3	1 17 28.546	2.998	— 8 51 36.83	18.70
*A Cassiopeæ (38) . . . . .	6	1 21 31.296	4.348	+69 35 20.61	18.72
<i>η</i> Piscium . . . . .	4.3	1 24 28.524	+ 3.199	+14 40 10.35	+18.71
<i>α</i> Eridani ( <i>Achernar</i> ) . . . . .	1	1 32 49.791	2.235	—57 54 9.93	18.42
<i>ο</i> Piscium . . . . .	4	1 38 28.749	3.162	+ 8 29 50.28	18.24
<i>β</i> Arietis . . . . .	3.2	1 47 24.434	3.300	+20 9 59.46	17.78
*50 Cassiopeæ . . . . .	4	1 52 17.999	4.973	+71 47 6.66	17.69
<i>α</i> Arietis . . . . .	2	1 59 47.584	+ 3.368	+22 50 30.45	+17.24
65 Ceti ( <i>ξ</i> <sup>1</sup> ) . . . . .	4.5	2 6 3.495	3.169	+ 8 13 51.36	17.06
* <i>ι</i> Cassiopeæ . . . . .	4	2 18 18.319	4.836	+66 48 39.30	16.49
<i>γ</i> Ceti . . . . .	3.4	2 36 30.882	3.102	+ 2 40 54.46	15.37
<i>α</i> Ceti . . . . .	2.3	2 55 26.009	3.129	+ 3 34 26.31	14.36
*48 Cephei (H.) . . . . .	6	3 3 47.896	+ 7.335	+77 14 55.07	+13.88
<i>ζ</i> Arietis . . . . .	4.5	3 7 22.522	3.436	+20 33 25.76	13.65
<i>α</i> Persei . . . . .	2	3 14 58.904	4.247	+49 23 31.98	13.18
<i>δ</i> Persei . . . . .	3	3 33 36.335	4.238	+27 21 57.01	11.91
<i>η</i> Tauri . . . . .	3	3 39 42.040	3.553	+23 41 51.81	11.46
<i>ζ</i> Persei . . . . .	3	3 45 54.116	+ 3.756	+31 29 31.33	+11.02
<i>γ</i> <sup>1</sup> Eridani . . . . .	3	3 51 55.084	2.796	—13 52 59.43	10.51
<i>γ</i> Tauri . . . . .	4	4 12 20.426	3.407	+15 18 31.77	9.05
<i>ε</i> Tauri . . . . .	4.3	4 20 58.160	3.495	+18 53 14.07	8.37
<i>α</i> Tauri ( <i>Aldebaran</i> ) . . . . .	1	4 28 24.356	3.436	+16 14 37.30	7.64
* <i>α</i> Camelopardalis (9) . . . . .	4	4 41 2.534	+ 5.911	+66 6 56.75	+ 6.78
<i>ι</i> Aurigæ . . . . .	3	4 48 27.922	3.896	+32 57 20.55	6.14
11 Orionis . . . . .	5	4 57 5.148	3.425	+15 13 8.94	5.41
<i>α</i> Aurigæ ( <i>Capella</i> ) . . . . .	1	5 7 0.909	4.422	+45 51 41.24	4.18
<i>β</i> Orionis ( <i>Rigel</i> ) . . . . .	1	5 8 14.575	2.881	— 8 21 19.05	4.47
<i>β</i> Tauri . . . . .	2	5 18 0.725	+ 3.787	+28 29 37.28	+ 3.46
* Groombridge 966 . . . . .	6.7	5 22 13.697	7.985	+74 57 2.06	3.29
<i>δ</i> Orionis . . . . .	2	5 25 18.910	3.064	— 0 23 55.65	2.98
<i>α</i> Leporis . . . . .	3	5 26 57.236	2.646	—17 55 5.38	2.88
<i>ε</i> Orionis . . . . .	2	5 29 34.012	3.042	— 1 17 17.14	2.65
<i>α</i> Columbæ . . . . .	2	5 34 54.446	+ 2.173	—34 8 42.31	+ 2.19
<i>α</i> Orionis . . . . .	var.	5 48 4.822	3.247	+ 7 22 47.81	+ 1.04
*22 Camelopardalis (H.) . . . . .	5.4	6 4 24.221	6.619	+69 21 38.73	— 0.49
<i>μ</i> Geminorum . . . . .	3	6 15 2.130	3.633	+22 34 39.94	1.46
<i>α</i> Argus ( <i>Canopus</i> ) . . . . .	1	6 21 2.750	1.330	—52 37 30.21	1.84
<i>γ</i> Geminorum . . . . .	2.3	6 30 8.647	+ 3.469	+16 30 30.29	— 2.67
*51 Cephei (H.) . . . . .	5	6 38 12.030	30.323	+87 14 26.04	3.33
<i>α</i> Canis Maj. ( <i>Sirius</i> ) . . . . .	1	6 39 22.483	2.645	—16 32 17.74	4.64
<i>ε</i> Canis Majoris . . . . .	2.1	6 53 28.727	2.359	—28 47 45.68	4.66
<i>δ</i> Canis Majoris . . . . .	2	7 3 3.954	+ 2.440	—26 11 12.75	— 5.44

MEAN PLACES FOR 1869.0. (Jan. 0— <sup>d</sup> 407.)					
Star's Name.	Magnitude.	Right Ascension.	An. Variation.	Declination.	An. Variation.
$\delta$ Geminorum . . .	3.4	<sup>h</sup> 7 <sup>m</sup> 12 <sup>s</sup> 17.890	+ 3.591	+22° 13' 14.80	— 6.24
* Piazzii vii. 67 . . .	6	7 17 13.542	6.316	+68 43 42.10	6.70
$\alpha$ Geminor. ( <i>Castor</i> ) .	2.1	7 26 14.011	3.840	+32 10 22.64	7.45
$\alpha$ Can. Min. ( <i>Procyon</i> )	1	7 32 26.682	3.146	+ 5 33 30.48	8.92
$\beta$ Geminor. ( <i>Pollux</i> ) .	1.2	7 37 17.822	3.682	+28 20 24.21	8.32
$\epsilon$ Geminorum . . .	5	7 45 28.670	+ 3.685	+27 6 7.27	— 8.96
* 3 Ursæ Majoris (H.) .	6	7 59 44.554	6.073	+68 51 19.88	10.02
15 Argus ( $\iota$ ) . . .	3	8 1 57.988	2.556	—23 55 42.08	10.12
$\epsilon$ Hydræ . . .	3.4	8 39 50.278	3.184	+ 6 53 51.54	12.92
$\iota$ Ursæ Majoris . . .	3	8 50 13.583	4.142	+48 33 13.44	13.84
* $\sigma^2$ Ursæ Majoris . . .	5	8 58 49.783	+ 5.382	+67 39 46.69	—14.20
$\kappa$ Cancri . . .	5	9 0 38.979	3.256	+11 11 36.77	14.23
$\iota$ Argus . . .	2	9 13 34.946	1.602	—58 43 32.08	14.92
* 1 Draconis (H.) . . .	4.5	9 18 11.142	9.161	+81 54 5.58	15.25
$\alpha$ Hydræ . . .	2	9 21 9.006	2.950	— 8 5 31.30	15.39
* 24 Ursæ Majoris ( $d$ ) .	5.4	9 22 50.951	+ 5.435	+70 24 12.48	—15.47
$\theta$ Ursæ Majoris . . .	3	9 24 4.783	4.053	+52 16 20.68	16.16
$\epsilon$ Leonis . . .	3	9 38 24.702	3.420	+24 22 33.45	16.37
$\mu$ Leonis . . .	4	9 45 18.468	3.425	+26 37 21.21	16.75
$\alpha$ Leonis ( <i>Regulus</i> ) .	1.2	10 1 23.631	3.204	+12 36 23.22	17.42
* 32 Ursæ Majoris . . .	6	10 8 29.372	+ 4.444	+65 45 36.61	—17.76
$\gamma^1$ Leonis . . .	2	10 12 44.806	3.318	+20 30 10.61	18.05
* 9 Draconis (H.) . . .	5.4	10 23 53.165	5.320	+76 23 10.14	18.35
$\rho$ Leonis . . .	4	10 25 54.759	3.167	+ 9 58 46.57	18.42
$\eta$ Argus . . .	2	10 39 59.053	2.309	—58 59 44.00	18.76
$l$ Leonis . . .	5	10 42 22.135	+ 3.160	+11 14 15.09	—18.94
$\alpha$ Ursæ Majoris . . .	2	10 55 37.267	3.763	+62 27 26.55	19.36
$\delta$ Leonis . . .	2.3	11 7 8.350	3.203	+21 14 27.29	19.66
$\delta$ Crateris . . .	3.4	11 12 47.584	2.996	—14 4 12.73	19.45
$\tau$ Leonis . . .	5	11 21 12.026	3.088	+ 3 34 38.57	19.79
* $\lambda$ Draconis . . .	3.4	11 23 35.716	+ 3.644	+70 3 12.21	—19.86
91 Leonis ( $\upsilon$ ) . . .	5.4	11 30 14.535	3.072	— 0 6 2.69	19.86
$\beta$ Leonis . . .	2	11 42 22.579	3.066	+15 18 15.99	20.10
$\gamma$ Ursæ Majoris . . .	2.3	11 46 55.716	3.190	+54 25 22.99	20.03
$\upsilon$ Virginis . . .	4	11 58 32.210	3.061	+ 9 27 37.68	20.03
4 Draconis (H.) . . .	5.4	12 6 1.926	+ 2.912	+78 20 38.01	—20.06
* $\beta$ Chamæleontis . . .	5	12 10 42.603	3.337	—78 35 5.93	20.04
* $\eta$ Virginis . . .	3.4	12 13 12.274	3.068	+ 0 3 41.10	20.05
$\alpha^1$ Crucis . . .	1	12 19 19.441	3.264	—62 22 18.23	19.93
$\beta$ Corvi . . .	2.3	12 27 30.513	3.135	—22 40 19.86	19.98
* $\kappa$ Draconis . . .	3.4	12 27 52.684	+ 2.603	+70 30 37.02	—19.93
* 32 Camelop. (H.) ( <i>fol.</i> )	5.4	12 48 11.660	0.347	+84 7 28.80	19.63
12 Canum Venaticorum	3	12 49 53.782	2.818	+39 1 35.16	19.52
$\theta$ Virginis . . .	4.5	13 3 10.180	3.101	— 4 50 20.26	19.34
$\alpha$ Virginis ( <i>Spica</i> ) . .	1	13 18 17.684	3.153	—10 28 35.77	18.93
$\zeta$ Virginis . . .	3.4	13 28 1.179	+ 3.053	+ 0 4 29.64	—18.53
$\eta$ Ursæ Majoris . . .	2	13 42 22.612	2.374	+49 58 4.78	18.11
$\eta$ Bootis . . .	3	13 48 26.871	2.859	+19 3 19.33	18.21
$\beta$ Centauri . . .	1	13 54 36.100	4.161	—59 44 21.92	17.67
* $\alpha$ Draconis . . .	3.4	14 0 50.643	+ 1.623	+65 0 7.76	—17.36



## MEAN PLACES FOR 1869.0. (Jan. 0—<sup>d</sup>.407.)

Star's Name.	Magnitude.	Right Ascension.	An. Variation.	Declination.	An. Variation.
$\alpha$ Bootis ( <i>Arcturus</i> ) . . . . .	1	<sup>h</sup> 14 <sup>m</sup> 9 <sup>s</sup> 41.206	+ 2.734	+19° 51' 57".31	—18.90
$\theta$ Bootis . . . . .	4.3	14 20 44.186	+ 2.043	+52 27 25.44	16.80
* 5 Ursæ Minoris . . . . .	5.4	14 27 50.044	— 0.215	+76 16 40.69	16.05
$\alpha^2$ Centauri . . . . .	1	14 30 44.261	+ 4.033	—60 17 24.28	15.04
$\epsilon$ Bootis . . . . .	2.3	14 39 15.981	+ 2.622	+27 37 39.88	15.39
$\alpha^2$ Libræ . . . . .	2.3	14 43 38.094	+ 3.306	—15 29 43.50	—15.21
* $\beta$ Ursæ Minoris . . . . .	2	14 51 6.889	— 0.252	+74 41 25.84	14.75
$\beta$ Bootis . . . . .	3	14 57 0.689	+ 2.260	+40 54 29.84	14.42
$\beta$ Libræ . . . . .	2	15 9 57.615	+ 3.220	— 8 53 51.46	13.56
$\mu^1$ Bootis . . . . .	4.3	15 19 32.557	+ 2.268	+37 50 16.65	12.83
* $\gamma^2$ Ursæ Minoris . . . . .	3	15 20 57.373	— 0.149	+72 18 0.93	—12.80
$\alpha$ Coronæ Borealis . . . . .	2	15 29 8.517	+ 2.539	+27 9 27.13	12.33
$\alpha$ Serpentis . . . . .	2.3	15 37 48.986	+ 2.950	+ 6 50 23.56	11.60
$\epsilon$ Serpentis . . . . .	3.4	15 44 17.257	+ 2.987	+ 4 52 26.23	11.12
* $\zeta$ Ursæ Minoris . . . . .	4.5	15 48 47.642	— 2.293	+78 11 46.13	10.87
$\epsilon$ Coronæ Borealis . . . . .	4	15 52 9.958	+ 2.485	+27 15 31.94	—10.67
$\delta$ Scorpii . . . . .	2.3	15 52 35.454	+ 3.536	—22 14 46.91	10.59
$\beta^1$ Scorpii . . . . .	2	15 57 49.313	3.477	—19 26 40.01	10.21
* Groombridge 2320 . . . . .	6.5	16 5 58.332	0.132	+68 9 19.47	9.50
$\delta$ Ophiuchi . . . . .	3	16 7 28.928	3.138	— 3 21 17.59	9.59
$\tau$ Herculis . . . . .	3.4	16 15 48.126	+ 1.798	+46 37 35.43	— 8.78
$\alpha$ Scorpii ( <i>Antares</i> ) . . . . .	1.2	16 21 22.742	+ 3.668	—26 8 18.06	8.39
$\eta$ Draconis . . . . .	3.2	16 22 13.957	+ 0.823	+61 48 41.22	8.22
* 15 Draconis (A.) . . . . .	5	16 28 15.095	— 0.143	+69 3 5.38	7.78
$\zeta$ Ophiuchi . . . . .	3.2	16 29 56.860	+ 3.298	—10 17 57.36	7.65
* $\alpha$ Trianguli Australis . . . . .	2	16 34 49.275	+ 6.281	—68 46 56.72	— 7.36
$\eta$ Herculis . . . . .	3	16 38 24.336	+ 2.054	+39 10 22.85	7.06
$\kappa$ Ophiuchi . . . . .	3.4	16 51 28.070	+ 2.835	+ 9 34 50.89	5.88
$\delta$ Herculis . . . . .	5	16 56 46.072	+ 2.209	+33 45 35.07	5.43
* $\epsilon$ Ursæ Minoris . . . . .	4.5	16 59 29.218	— 6.395	+82 14 54.32	5.23
$\alpha^1$ Herculis . . . . .	var.	17 8 40.481	+ 2.733	+14 32 31.15	— 4.41
$\delta$ Ophiuchi (44) . . . . .	5	17 18 22.284	3.659	—24 3 6.88	3.74
$\beta$ Draconis . . . . .	3.2	17 27 28.347	+ 1.351	+52 23 57.41	2.84
$\alpha$ Ophiuchi . . . . .	2	17 28 51.225	+ 2.782	+12 39 28.32	2.92
* $\omega$ Draconis . . . . .	5	17 37 43.259	— 0.356	+68 49 3.89	1.65
$\mu$ Herculis . . . . .	3.4	17 41 19.941	+ 2.345	+27 47 56.22	— 2.37
* $\psi^1$ Draconis ( <i>pr.</i> ) . . . . .	4.5	17 44 16.375	— 1.084	+72 12 44.65	1.64
$\gamma$ Draconis . . . . .	2.3	17 53 34.008	+ 1.394	+51 30 19.00	0.60
$\gamma^2$ Sagittarii . . . . .	3.4	17 57 23.610	3.852	—30 25 22.08	— 0.46
* $\sigma$ Octantis . . . . .	6	18 4 29.580	109.247	—89 16 43.33	+ 0.39
$\mu^1$ Sagittarii . . . . .	4	18 5 55.754	+ 3.586	—21 5 25.33	+ 0.51
$\eta$ Serpentis . . . . .	3	18 14 31.850	+ 3.099	— 2 55 49.91	0.59
* $\delta$ Ursæ Minoris . . . . .	4.5	18 14 35.853	—19.392	+86 36 18.89	1.29
1 Aquilæ (3 H. Scuti) . . . . .	4.5	18 28 4.640	+ 3.264	— 8 20 0.15	2.12
$\alpha$ Lyræ ( <i>Vega</i> ) . . . . .	1	18 32 30.180	+ 2.032	+38 39 48.21	3.12
$\beta$ Lyræ . . . . .	var.	18 45 14.598	+ 2.214	+33 12 43.18	+ 3.90
$\sigma$ Sagittarii . . . . .	2.3	18 47 8.498	+ 3.724	—26 27 22.98	4.02
* 50 Draconis . . . . .	6	18 50 35.016	— 1.896	+75 16 39.84	4.45
$\zeta$ Aquilæ . . . . .	3	18 59 23.276	+ 2.755	+13 40 15.56	+ 5.07

MEAN PLACES FOR 1869.0. (Jan. 0— <sup>d</sup> .407.)					
Star's Name.	Magnitude.	Right Ascension.	An. Variation.	Declination.	An. Variation.
<i>d</i> Sagittarii . . . .	5	<sup>h</sup> 19 <sup>m</sup> 9 <sup>s</sup> 58.180	+ 3.515	—19° 11' 1.05	+ 6.04
* <i>δ</i> Draconis . . . .	3	19 12 31.072	+ 0.034	+67 25 51.51	6.31
* <i>τ</i> Draconis . . . .	5	19 18 3.360	— 1.105	+73 6 40.62	6.80
<i>δ</i> Aquilæ . . . .	3.4	19 18 53.535	+ 3.025	+ 2 51 21.07	6.87
<i>κ</i> Aquilæ . . . .	5	19 29 50.541	+ 3.230	— 7 18 59.02	7.66
<i>γ</i> Aquilæ . . . .	3	19 40 1.880	+ 2.853	+10 17 46.03	+ 8.48
<i>α</i> Aquilæ ( <i>Altair</i> ) . . . .	1.2	19 44 23.459	+ 2.928	+ 8 31 28.17	9.21
* <i>ε</i> Draconis . . . .	4	19 48 36.128	— 0.170	+69 56 2.09	9.15
<i>β</i> Aquilæ . . . .	4	19 48 52.669	+ 2.947	+ 6 4 53.64	8.69
* <i>λ</i> Ursæ Minoris . . . .	6.7	19 55 15.780	—58.856	+88 54 54.86	9.68
<i>τ</i> Aquilæ . . . .	6.5	19 57 44.478	+ 2.935	+ 6 54 36.57	+ 9.87
<i>α</i> <sup>2</sup> Capricorni . . . .	3.4	20 10 47.037	+ 3.333	—12 56 55.15	10.84
* <i>κ</i> Cephei . . . .	4.5	20 13 14.997	— 1.889	+77 18 55.12	11.01
<i>α</i> Pavonis . . . .	2	20 15 16.390	+ 4.796	—57 9 4.75	11.13
<i>π</i> Capricorni . . . .	5	20 19 49.217	+ 3.442	—18 38 19.59	11.51
<i>ε</i> Delphini . . . .	4	20 26 57.225	+ 2.866	+10 51 34.82	+11.99
* Groombridge 3241 . . . .	6.7	20 30 32.908	— 0.211	+72 5 15.98	12.23
<i>α</i> Cygni . . . .	2.1	20 36 57.972	+ 2.044	+44 48 48.30	12.69
<i>μ</i> Aquarii . . . .	5.4	20 45 35.134	+ 3.241	— 9 28 22.63	13.22
<i>ν</i> Cygni . . . .	4	20 52 17.378	+ 2.234	+40 39 50.55	13.71
* 12 Year Cat. 1879 . . . .	6	20 53 26.528	— 2.486	+80 3 33.25	+13.72
61 <sup>1</sup> Cygni . . . .	5.6	21 1 1.270	+ 2.673	+38 6 23.30	17.46
<i>ζ</i> Cygni . . . .	3	21 7 21.677	2.550	+29 41 26.69	14.56
<i>α</i> Cephei . . . .	3.2	21 15 27.078	1.438	+62 1 50.89	15.11
1 Pegasi . . . .	4.5	21 16 1.779	2.775	+19 14 44.59	15.23
<i>β</i> Aquarii . . . .	3	21 24 39.669	+ 3.164	— 6 8 45.64	+15.62
* <i>β</i> Cephei . . . .	3	21 26 57.558	0.801	+69 59 8.36	15.71
<i>ζ</i> Aquarii . . . .	5.4	21 30 46.568	3.199	— 8 26 25.04	15.91
<i>ε</i> Pegasi . . . .	2.3	21 37 45.132	2.948	+ 9 16 32.31	16.31
* 11 Cephei . . . .	5	21 39 59.641	0.908	+70 42 30.03	16.50
<i>μ</i> Capricorni . . . .	5	21 46 9.138	+ 3.281	—14 10 1.53	+16.75
* 79 Draconis . . . .	6.7	21 51 14.229	0.739	+73 4 57.43	16.96
<i>α</i> Aquarii . . . .	3	21 59 3.278	3.084	— 0 57 18.14	17.33
<i>α</i> Gruis . . . .	2	21 59 57.930	3.815	—47 35 37.19	17.18
<i>θ</i> Aquarii . . . .	4.5	22 9 55.167	3.171	— 8 26 4.26	17.76
<i>π</i> Aquarii . . . .	5.4	22 18 35.178	+ 3.065	+ 0 42 48.23	+18.11
<i>η</i> Aquarii . . . .	4.3	22 28 37.436	3.084	— 0 47 30.71	18.42
* 226 Cephei (B.) . . . .	5.6	22 29 57.841	1.084	+75 33 4.79	18.52
<i>ζ</i> Pegasi . . . .	3.4	22 34 55.684	2.988	+10 8 54.08	18.69
* <i>ι</i> Cephei . . . .	4.3	22 45 1.289	2.117	+65 30 42.21	18.85
<i>λ</i> Aquarii . . . .	4	22 45 46.662	+ 3.131	— 8 16 33.71	+19.04
<i>α</i> Pis. Aus. ( <i>Fomalhaut</i> ) . . . .	1.2	22 50 24.400	3.330	—30 18 56.83	18.97
<i>α</i> Pegasi ( <i>Markab</i> ) . . . .	2	22 58 14.196	2.984	+14 30 4.75	19.32
* <i>ο</i> Cephei . . . .	6.5	23 13 15.428	2.435	+67 23 40.92	19.62
<i>θ</i> Piscium . . . .	4.5	23 21 19.376	3.041	+ 5 39 34.20	19.71
<i>ι</i> Piscium . . . .	4.5	23 33 12.820	+ 3.085	+ 4 54 59.02	+19.47
* <i>γ</i> Cephei . . . .	3.4	23 33 59.399	2.401	+76 54 4.70	20.07
* Groombridge 4163 . . . .	7	23 48 29.231	2.847	+73 40 52.29	20.00
<i>ω</i> Piscium . . . .	4	23 52 35.128	+ 3.078	+ 6 8 16.64	+19.91

## APPARENT PLACES OF $\alpha$ URSÆ MINORIS, (*Polaris*), FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	JANUARY.		Mean Solar Date.	FEBRUARY.		Mean Solar Date.	MARCH.		Mean Solar Date.	APRIL.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sub>1</sub> <sup>m</sup> <sub>10</sub>	<sup>°</sup> <sub>88</sub> <sup>'</sup> <sub>36</sub>		<sup>h</sup> <sub>1</sub> <sup>m</sup> <sub>10</sub>	<sup>°</sup> <sub>88</sub> <sup>'</sup> <sub>36</sub>		<sup>h</sup> <sub>1</sub> <sup>m</sup> <sub>10</sub>	<sup>°</sup> <sub>88</sub> <sup>'</sup> <sub>36</sub>		<sup>h</sup> <sub>1</sub> <sup>m</sup> <sub>10</sub>	<sup>°</sup> <sub>88</sub> <sup>'</sup> <sub>36</sub>
0.3	<sup>s</sup> <sub>79.37</sub>	<sup>"</sup> <sub>53.3</sub>	1.2	<sup>s</sup> <sub>50.32</sub>	<sup>"</sup> <sub>53.1</sub>	1.1	<sup>s</sup> <sub>29.88</sub>	<sup>"</sup> <sub>48.0</sub>	1.0	<sup>s</sup> <sub>20.05</sub>	<sup>"</sup> <sub>38.8</sub>
1.3	<sup>s</sup> <sub>78.38</sub>	<sup>"</sup> <sub>53.4</sub>	2.2	<sup>s</sup> <sub>49.50</sub>	<sup>"</sup> <sub>53.0</sub>	2.1	<sup>s</sup> <sub>29.39</sub>	<sup>"</sup> <sub>47.7</sub>	2.0	<sup>s</sup> <sub>20.07</sub>	<sup>"</sup> <sub>38.6</sub>
2.3	<sup>s</sup> <sub>77.36</sub>	<sup>"</sup> <sub>53.5</sub>	3.2	<sup>s</sup> <sub>48.73</sub>	<sup>"</sup> <sub>52.8</sub>	3.1	<sup>s</sup> <sub>28.94</sub>	<sup>"</sup> <sub>47.4</sub>	3.0	<sup>s</sup> <sub>20.07</sub>	<sup>"</sup> <sub>38.3</sub>
3.3	<sup>s</sup> <sub>76.39</sub>	<sup>"</sup> <sub>53.6</sub>	4.2	<sup>s</sup> <sub>48.00</sub>	<sup>"</sup> <sub>52.7</sub>	4.1	<sup>s</sup> <sub>28.53</sub>	<sup>"</sup> <sub>47.1</sub>	4.0	<sup>s</sup> <sub>20.03</sub>	<sup>"</sup> <sub>38.0</sub>
4.3	<sup>s</sup> <sub>75.46</sub>	<sup>"</sup> <sub>53.6</sub>	5.2	<sup>s</sup> <sub>47.29</sub>	<sup>"</sup> <sub>52.6</sub>	5.1	<sup>s</sup> <sub>28.11</sub>	<sup>"</sup> <sub>46.9</sub>	5.0	<sup>s</sup> <sub>19.95</sub>	<sup>"</sup> <sub>37.7</sub>
5.3	<sup>s</sup> <sub>74.58</sub>	<sup>"</sup> <sub>53.6</sub>	6.2	<sup>s</sup> <sub>46.55</sub>	<sup>"</sup> <sub>52.5</sub>	6.1	<sup>s</sup> <sub>27.68</sub>	<sup>"</sup> <sub>46.7</sub>	6.0	<sup>s</sup> <sub>19.87</sub>	<sup>"</sup> <sub>37.4</sub>
6.3	<sup>s</sup> <sub>73.75</sub>	<sup>"</sup> <sub>53.7</sub>	7.2	<sup>s</sup> <sub>45.77</sub>	<sup>"</sup> <sub>52.4</sub>	7.1	<sup>s</sup> <sub>27.22</sub>	<sup>"</sup> <sub>46.4</sub>	7.0	<sup>s</sup> <sub>19.78</sub>	<sup>"</sup> <sub>37.1</sub>
7.2	<sup>s</sup> <sub>72.94</sub>	<sup>"</sup> <sub>53.7</sub>	8.2	<sup>s</sup> <sub>44.96</sub>	<sup>"</sup> <sub>52.3</sub>	8.1	<sup>s</sup> <sub>26.71</sub>	<sup>"</sup> <sub>46.2</sub>	8.0	<sup>s</sup> <sub>19.71</sub>	<sup>"</sup> <sub>36.8</sub>
8.2	<sup>s</sup> <sub>72.16</sub>	<sup>"</sup> <sub>53.8</sub>	9.2	<sup>s</sup> <sub>44.10</sub>	<sup>"</sup> <sub>52.2</sub>	9.1	<sup>s</sup> <sub>26.18</sub>	<sup>"</sup> <sub>45.9</sub>	9.0	<sup>s</sup> <sub>19.68</sub>	<sup>"</sup> <sub>36.5</sub>
9.2	<sup>s</sup> <sub>71.34</sub>	<sup>"</sup> <sub>53.8</sub>	10.2	<sup>s</sup> <sub>43.23</sub>	<sup>"</sup> <sub>52.0</sub>	10.1	<sup>s</sup> <sub>25.63</sub>	<sup>"</sup> <sub>45.7</sub>	10.0	<sup>s</sup> <sub>19.71</sub>	<sup>"</sup> <sub>36.1</sub>
10.2	<sup>s</sup> <sub>70.51</sub>	<sup>"</sup> <sub>53.9</sub>	11.2	<sup>s</sup> <sub>42.34</sub>	<sup>"</sup> <sub>51.9</sub>	11.1	<sup>s</sup> <sub>25.08</sub>	<sup>"</sup> <sub>45.4</sub>	11.0	<sup>s</sup> <sub>19.81</sub>	<sup>"</sup> <sub>35.8</sub>
11.2	<sup>s</sup> <sub>69.63</sub>	<sup>"</sup> <sub>54.0</sub>	12.2	<sup>s</sup> <sub>41.46</sub>	<sup>"</sup> <sub>51.7</sub>	12.1	<sup>s</sup> <sub>24.57</sub>	<sup>"</sup> <sub>45.1</sub>	12.0	<sup>s</sup> <sub>19.99</sub>	<sup>"</sup> <sub>35.4</sub>
12.2	<sup>s</sup> <sub>68.70</sub>	<sup>"</sup> <sub>54.0</sub>	13.1	<sup>s</sup> <sub>40.60</sub>	<sup>"</sup> <sub>51.5</sub>	13.1	<sup>s</sup> <sub>24.11</sub>	<sup>"</sup> <sub>44.8</sub>	13.0	<sup>s</sup> <sub>20.22</sub>	<sup>"</sup> <sub>35.1</sub>
13.2	<sup>s</sup> <sub>67.72</sub>	<sup>"</sup> <sub>54.1</sub>	14.1	<sup>s</sup> <sub>39.81</sub>	<sup>"</sup> <sub>51.3</sub>	14.1	<sup>s</sup> <sub>23.72</sub>	<sup>"</sup> <sub>44.4</sub>	14.0	<sup>s</sup> <sub>20.49</sub>	<sup>"</sup> <sub>34.8</sub>
14.2	<sup>s</sup> <sub>66.70</sub>	<sup>"</sup> <sub>54.1</sub>	15.1	<sup>s</sup> <sub>39.08</sub>	<sup>"</sup> <sub>51.0</sub>	15.1	<sup>s</sup> <sub>23.41</sub>	<sup>"</sup> <sub>44.1</sub>	15.0	<sup>s</sup> <sub>20.74</sub>	<sup>"</sup> <sub>34.5</sub>
15.2	<sup>s</sup> <sub>65.67</sub>	<sup>"</sup> <sub>54.1</sub>	16.1	<sup>s</sup> <sub>38.42</sub>	<sup>"</sup> <sub>50.8</sub>	16.1	<sup>s</sup> <sub>23.13</sub>	<sup>"</sup> <sub>43.8</sub>	16.0	<sup>s</sup> <sub>20.99</sub>	<sup>"</sup> <sub>34.2</sub>
16.2	<sup>s</sup> <sub>64.66</sub>	<sup>"</sup> <sub>54.1</sub>	17.1	<sup>s</sup> <sub>37.77</sub>	<sup>"</sup> <sub>50.6</sub>	17.1	<sup>s</sup> <sub>22.91</sub>	<sup>"</sup> <sub>43.5</sub>	17.0	<sup>s</sup> <sub>21.21</sub>	<sup>"</sup> <sub>34.0</sub>
17.2	<sup>s</sup> <sub>63.68</sub>	<sup>"</sup> <sub>54.1</sub>	18.1	<sup>s</sup> <sub>37.17</sub>	<sup>"</sup> <sub>50.4</sub>	18.1	<sup>s</sup> <sub>22.71</sub>	<sup>"</sup> <sub>43.2</sub>	18.0	<sup>s</sup> <sub>21.38</sub>	<sup>"</sup> <sub>33.7</sub>
18.2	<sup>s</sup> <sub>62.74</sub>	<sup>"</sup> <sub>54.0</sub>	19.1	<sup>s</sup> <sub>36.58</sub>	<sup>"</sup> <sub>50.2</sub>	19.1	<sup>s</sup> <sub>22.49</sub>	<sup>"</sup> <sub>42.9</sub>	19.0	<sup>s</sup> <sub>21.52</sub>	<sup>"</sup> <sub>33.4</sub>
19.2	<sup>s</sup> <sub>61.86</sub>	<sup>"</sup> <sub>54.0</sub>	20.1	<sup>s</sup> <sub>35.96</sub>	<sup>"</sup> <sub>50.0</sub>	20.1	<sup>s</sup> <sub>22.26</sub>	<sup>"</sup> <sub>42.6</sub>	20.0	<sup>s</sup> <sub>21.65</sub>	<sup>"</sup> <sub>33.2</sub>
20.2	<sup>s</sup> <sub>61.03</sub>	<sup>"</sup> <sub>53.9</sub>	21.1	<sup>s</sup> <sub>35.32</sub>	<sup>"</sup> <sub>49.9</sub>	21.1	<sup>s</sup> <sub>22.01</sub>	<sup>"</sup> <sub>42.3</sub>	21.0	<sup>s</sup> <sub>21.78</sub>	<sup>"</sup> <sub>32.9</sub>
21.2	<sup>s</sup> <sub>60.23</sub>	<sup>"</sup> <sub>53.9</sub>	22.1	<sup>s</sup> <sub>34.63</sub>	<sup>"</sup> <sub>49.7</sub>	22.0	<sup>s</sup> <sub>21.70</sub>	<sup>"</sup> <sub>42.1</sub>	22.0	<sup>s</sup> <sub>21.96</sub>	<sup>"</sup> <sub>32.6</sub>
22.2	<sup>s</sup> <sub>59.45</sub>	<sup>"</sup> <sub>53.8</sub>	23.1	<sup>s</sup> <sub>33.91</sub>	<sup>"</sup> <sub>49.5</sub>	23.0	<sup>s</sup> <sub>21.39</sub>	<sup>"</sup> <sub>41.8</sub>	23.0	<sup>s</sup> <sub>22.18</sub>	<sup>"</sup> <sub>32.2</sub>
23.2	<sup>s</sup> <sub>58.64</sub>	<sup>"</sup> <sub>53.8</sub>	24.1	<sup>s</sup> <sub>33.18</sub>	<sup>"</sup> <sub>49.3</sub>	24.0	<sup>s</sup> <sub>21.06</sub>	<sup>"</sup> <sub>41.5</sub>	24.0	<sup>s</sup> <sub>22.47</sub>	<sup>"</sup> <sub>31.9</sub>
24.2	<sup>s</sup> <sub>57.80</sub>	<sup>"</sup> <sub>53.8</sub>	25.1	<sup>s</sup> <sub>32.43</sub>	<sup>"</sup> <sub>49.0</sub>	25.0	<sup>s</sup> <sub>20.73</sub>	<sup>"</sup> <sub>41.2</sub>	25.0	<sup>s</sup> <sub>22.81</sub>	<sup>"</sup> <sub>31.6</sub>
25.2	<sup>s</sup> <sub>56.93</sub>	<sup>"</sup> <sub>53.8</sub>	26.1	<sup>s</sup> <sub>31.72</sub>	<sup>"</sup> <sub>48.8</sub>	26.0	<sup>s</sup> <sub>20.47</sub>	<sup>"</sup> <sub>40.8</sub>	25.9	<sup>s</sup> <sub>23.21</sub>	<sup>"</sup> <sub>31.3</sub>
26.2	<sup>s</sup> <sub>56.01</sub>	<sup>"</sup> <sub>53.7</sub>	27.1	<sup>s</sup> <sub>31.05</sub>	<sup>"</sup> <sub>48.5</sub>	27.0	<sup>s</sup> <sub>20.26</sub>	<sup>"</sup> <sub>40.5</sub>	26.9	<sup>s</sup> <sub>23.66</sub>	<sup>"</sup> <sub>31.0</sub>
27.2	<sup>s</sup> <sub>55.04</sub>	<sup>"</sup> <sub>53.7</sub>	28.1	<sup>s</sup> <sub>30.43</sub>	<sup>"</sup> <sub>48.2</sub>	28.0	<sup>s</sup> <sub>20.11</sub>	<sup>"</sup> <sub>40.2</sub>	27.9	<sup>s</sup> <sub>24.14</sub>	<sup>"</sup> <sub>30.7</sub>
28.2	<sup>s</sup> <sub>54.06</sub>	<sup>"</sup> <sub>53.6</sub>	29.1	<sup>s</sup> <sub>29.88</sub>	<sup>"</sup> <sub>48.0</sub>	29.0	<sup>s</sup> <sub>20.04</sub>	<sup>"</sup> <sub>39.8</sub>	28.9	<sup>s</sup> <sub>24.60</sub>	<sup>"</sup> <sub>30.5</sub>
29.2	<sup>s</sup> <sub>53.06</sub>	<sup>"</sup> <sub>53.5</sub>	30.1	<sup>s</sup> <sub>29.39</sub>	<sup>"</sup> <sub>47.7</sub>	30.0	<sup>s</sup> <sub>20.00</sub>	<sup>"</sup> <sub>39.5</sub>	29.9	<sup>s</sup> <sub>25.04</sub>	<sup>"</sup> <sub>30.2</sub>
30.2	<sup>s</sup> <sub>52.10</sub>	<sup>"</sup> <sub>53.4</sub>	31.1	<sup>s</sup> <sub>28.94</sub>	<sup>"</sup> <sub>47.4</sub>	31.0	<sup>s</sup> <sub>20.02</sub>	<sup>"</sup> <sub>39.2</sub>	30.9	<sup>s</sup> <sub>25.46</sub>	<sup>"</sup> <sub>30.0</sub>
31.2	<sup>s</sup> <sub>51.19</sub>	<sup>"</sup> <sub>53.3</sub>	32.1	<sup>s</sup> <sub>28.53</sub>	<sup>"</sup> <sub>47.1</sub>	32.0	<sup>s</sup> <sub>20.05</sub>	<sup>"</sup> <sub>38.8</sub>	31.9	<sup>s</sup> <sub>25.83</sub>	<sup>"</sup> <sub>29.8</sub>

APPARENT PLACES OF  $\alpha$  URSÆ MINORIS, (*Polaris*), FOR THE UPPER TRANSIT  
AT WASHINGTON.

Mean Solar Date.	MAY.		Mean Solar Date.	JUNE.		Mean Solar Date.	JULY.		Mean Solar Date.	AUGUST.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sup>m</sup> 1 10	<sup>°</sup> <sup>'</sup> 88 36		<sup>h</sup> <sup>m</sup> 1 10	<sup>°</sup> <sup>'</sup> 88 36		<sup>h</sup> <sup>m</sup> 1 11	<sup>°</sup> <sup>'</sup> 88 36		<sup>h</sup> <sup>m</sup> 1 11	<sup>°</sup> <sup>'</sup> 88 36
	<sup>s</sup> "	<sup>s</sup> "		<sup>s</sup> "	<sup>s</sup> "		<sup>s</sup> "	<sup>s</sup> "		<sup>s</sup> "	<sup>s</sup> "
1.9	25.83	29.8	1.9	44.40	23.6	1.8	9.47	22.1	1.7	36.30	25.7
2.9	26.18	29.5	2.8	45.10	23.4	2.8	10.42	22.1	2.7	37.18	25.9
5.9	26.51	29.3	3.8	45.84	23.3	3.8	11.38	22.1	3.7	38.02	26.1
4.9	26.84	29.0	4.8	46.65	23.1	4.8	12.38	22.1	4.7	38.81	26.4
5.9	27.23	28.7	5.8	47.52	23.0	5.8	13.37	22.2	5.7	39.52	26.6
6.9	27.66	28.5	6.8	48.41	22.9	6.8	14.32	22.3	6.7	40.21	26.9
7.9	28.16	28.2	7.8	49.33	22.8	7.8	15.24	22.4	7.7	40.86	27.1
8.9	28.73	27.9	8.8	50.22	22.7	8.7	16.10	22.5	8.7	41.50	27.3
9.9	29.35	27.6	9.8	51.09	22.6	9.7	16.90	22.6	9.7	42.17	27.5
10.9	29.99	27.4	10.8	51.93	22.6	10.7	17.69	22.7	10.7	42.87	27.7
11.9	30.65	27.2	11.8	52.71	22.5	11.7	18.45	22.8	11.7	43.60	27.9
12.9	31.29	27.0	12.8	53.46	22.5	12.7	19.22	22.9	12.7	44.39	28.1
13.9	31.91	26.8	13.8	54.19	22.4	13.7	20.02	22.9	13.7	45.19	28.3
14.9	32.50	26.6	14.8	54.90	22.4	14.7	20.87	23.0	14.6	46.02	28.6
15.9	33.04	26.5	15.8	55.65	22.3	15.7	21.77	23.1	15.6	46.84	28.8
16.9	33.56	26.3	16.8	56.45	22.2	16.7	22.71	23.2	16.6	47.62	29.1
17.9	34.07	26.1	17.8	57.29	22.1	17.7	23.66	23.3	17.6	48.35	29.4
18.9	34.59	25.9	18.8	58.18	22.1	18.7	24.64	23.4	18.6	49.02	29.7
19.9	35.14	25.6	19.8	59.12	22.0	19.7	25.59	23.5	19.6	49.62	30.0
20.9	35.75	25.4	20.8	60.09	22.0	20.7	26.51	23.7	20.6	50.20	30.3
21.9	36.42	25.2	21.8	61.07	22.0	21.7	27.38	23.9	21.6	50.75	30.6
22.9	37.17	25.0	22.8	62.03	22.0	22.7	28.19	24.1	22.6	51.29	30.9
23.9	37.95	24.8	23.8	62.94	22.0	23.7	28.96	24.2	23.6	51.85	31.1
24.9	38.77	24.6	24.8	63.81	22.0	24.7	29.70	24.4	24.6	52.45	31.4
25.9	39.56	24.5	25.8	64.63	22.0	25.7	30.41	24.6	25.6	53.10	31.6
26.9	40.35	24.3	26.8	65.42	22.1	26.7	31.15	24.7	26.6	53.78	31.9
27.9	41.10	24.2	27.8	66.19	22.1	27.7	31.92	24.8	27.6	54.48	32.2
28.9	41.80	24.1	28.8	66.95	22.1	28.7	32.73	25.0	28.6	55.19	32.5
29.9	42.46	24.0	29.8	67.74	22.1	29.7	33.59	25.1	29.6	55.86	32.8
30.9	43.10	23.9	30.8	68.58	22.1	30.7	34.47	25.3	30.6	56.51	33.1
31.9	43.73	23.7	31.8	69.47	22.1	31.7	35.38	25.5	31.6	57.11	33.5
32.9	44.40	23.6	32.8	70.42	22.1	32.7	36.30	25.7	32.6	57.64	33.8

APPARENT PLACES OF  $\alpha$  URSÆ MINORIS, (*Polaris*,) FOR THE UPPER TRANSIT  
AT WASHINGTON.

Mean Solar Date.	SEPTEMBER.		Mean Solar Date.	OCTOBER.		Mean Solar Date.	NOVEMBER.		Mean Solar Date.	DECEMBER.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sup>m</sup> 1 11	88° 36'		<sup>h</sup> <sup>m</sup> 1 12	88° 36'		<sup>h</sup> <sup>m</sup> 1 11	88° 36'		<sup>h</sup> <sup>m</sup> 1 11	88° 37'
1.6	57.64	33.8	1.5	8.75	44.5	1.4	68.00	56.1	1.3	54.97	5.8
2.6	58.12	34.2	2.5	8.82	44.8	2.4	67.80	56.4	2.3	54.45	6.1
3.6	58.55	34.5	3.5	8.91	45.2	3.4	67.62	56.8	3.3	53.89	6.4
4.6	58.95	34.8	4.5	9.03	45.5	4.4	67.45	57.1	4.3	53.31	6.7
5.6	59.37	35.2	5.5	9.20	45.9	5.4	67.29	57.5	5.3	52.66	6.9
6.6	59.80	35.5	6.5	9.41	46.2	6.4	67.08	57.9	6.3	51.94	7.2
7.6	60.28	35.8	7.5	9.62	46.6	7.4	66.81	58.3	7.3	51.18	7.5
8.6	60.79	36.1	8.5	9.86	47.0	8.4	66.48	58.7	8.3	50.37	7.8
9.6	61.33	36.4	9.5	10.04	47.4	9.4	66.07	59.0	9.3	49.53	8.0
10.6	61.89	36.7	10.5	10.19	47.8	10.4	65.64	59.4	10.3	48.71	8.2
11.6	62.45	37.0	11.5	10.29	48.2	11.4	65.16	59.8	11.3	47.91	8.4
12.6	62.97	37.4	12.5	10.32	48.6	12.4	64.67	60.1	12.3	47.15	8.6
13.6	63.44	37.8	13.5	10.29	49.0	13.4	64.19	60.4	13.3	46.44	8.8
14.6	63.87	38.2	14.5	10.22	49.4	14.4	63.73	60.7	14.3	45.75	8.9
15.6	64.23	38.6	15.5	10.11	49.8	15.4	63.31	61.0	15.3	45.09	9.1
16.6	64.54	38.9	16.5	10.02	50.2	16.4	62.94	61.3	16.3	44.43	9.3
17.6	64.81	39.3	17.5	9.93	50.5	17.4	62.57	61.6	17.3	43.73	9.6
18.6	65.05	39.7	18.5	9.87	50.9	18.4	62.23	61.9	18.3	42.98	9.8
19.6	65.32	40.0	19.5	9.86	51.2	19.4	61.87	62.3	19.3	42.18	10.0
20.5	65.61	40.3	20.5	9.89	51.6	20.4	61.46	62.6	20.3	41.31	10.2
21.5	65.94	40.6	21.5	9.92	51.9	21.4	61.01	63.0	21.3	40.41	10.4
22.5	66.31	41.0	22.5	9.96	52.3	22.4	60.48	63.3	22.3	39.47	10.6
23.5	66.71	41.3	23.5	9.95	52.7	23.4	59.88	63.7	23.3	38.51	10.6
24.5	67.10	41.7	24.5	9.90	53.1	24.4	59.23	64.0	24.3	37.58	10.8
25.5	67.49	42.1	25.5	9.79	53.5	25.4	58.55	64.3	25.3	36.69	11.0
26.5	67.84	42.5	26.4	9.61	53.9	26.4	57.88	64.6	26.3	35.84	11.1
27.5	68.13	42.9	27.4	9.38	54.3	27.4	57.23	64.8	27.3	35.04	11.2
28.5	68.37	43.3	28.4	9.11	54.7	28.4	56.61	65.1	28.3	34.25	11.3
29.5	68.54	43.7	29.4	8.80	55.1	29.4	56.05	65.3	29.3	33.49	11.4
30.5	68.66	44.1	30.4	8.50	55.4	30.4	55.50	65.6	30.3	32.73	11.5
31.5	68.75	44.5	31.4	8.24	55.8	31.3	54.97	65.8	31.3	31.93	11.7
32.5	68.82	44.8	32.4	8.00	56.1	32.3	54.45	66.1	32.3	31.08	11.8

APPARENT PLACES OF 51 CEPHEI, (*Hev.*) FOR THE UPPER TRANSIT  
AT WASHINGTON.

Mean Solar Date.	JANUARY.		Mean Solar Date.	FEBRUARY.		Mean Solar Date.	MARCH.		Mean Solar Date.	APRIL.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sup>m</sup> 6 38	87° 14'		<sup>h</sup> <sup>m</sup> 6 38	87° 14'		<sup>h</sup> <sup>m</sup> 6 38	87° 14'		<sup>h</sup> <sup>m</sup> 6 37	87° 14'
0.5	<sup>s</sup> 32.02	19.5	1.4	<sup>s</sup> 29.98	29.8	1.3	<sup>s</sup> 21.63	36.3	1.2	<sup>s</sup> 68.63	38.6
1.5	32.10	19.9	2.4	29.73	30.1	2.3	21.21	36.5	2.2	68.25	38.6
2.5	32.14	20.2	3.4	29.50	30.3	3.3	20.81	36.6	3.2	67.88	38.5
3.5	32.16	20.6	4.4	29.28	30.5	4.3	20.44	36.7	4.2	67.50	38.5
4.5	32.16	20.9	5.4	29.07	30.8	5.3	20.09	36.8	5.2	67.11	38.5
5.5	32.16	21.2	6.4	28.89	31.0	6.3	19.74	36.9	6.2	66.70	38.5
6.5	32.16	21.5	7.4	28.71	31.3	7.3	19.40	37.1	7.2	66.27	38.5
7.5	32.17	21.8	8.4	28.51	31.6	8.3	19.05	37.2	8.2	65.81	38.5
8.5	32.21	22.1	9.4	28.30	31.8	9.3	18.67	37.4	9.2	65.34	38.4
9.5	32.24	22.4	10.4	28.06	32.1	10.3	18.26	37.5	10.2	64.86	38.4
10.5	32.28	22.7	11.4	27.79	32.4	11.3	17.84	37.7	11.2	64.39	38.3
11.5	32.33	23.0	12.4	27.48	32.7	12.3	17.37	37.8	12.2	63.95	38.2
12.5	32.36	23.4	13.4	27.13	33.0	13.3	16.90	37.9	13.2	63.52	38.0
13.5	32.36	23.8	14.4	26.79	33.3	14.3	16.42	38.0	14.2	63.14	37.9
14.5	32.35	24.1	15.4	26.43	33.5	15.3	15.96	38.1	15.2	62.77	37.8
15.5	32.29	24.5	16.4	26.09	33.7	16.3	15.51	38.2	16.2	62.43	37.7
16.5	32.20	24.8	17.4	25.77	33.9	17.3	15.09	38.2	17.2	62.08	37.6
17.4	32.08	25.2	18.4	25.45	34.1	18.3	14.68	38.2	18.2	61.74	37.5
18.4	31.94	25.5	19.4	25.17	34.2	19.3	14.29	38.3	19.2	61.39	37.4
19.4	31.81	25.8	20.4	24.89	34.4	20.3	13.92	38.3	20.2	61.01	37.3
20.4	31.68	26.1	21.4	24.61	34.6	21.3	13.55	38.4	21.2	60.60	37.2
21.4	31.58	26.4	22.4	24.32	34.9	22.3	13.16	38.5	22.2	60.18	37.1
22.4	31.48	26.6	23.3	24.01	35.1	23.3	12.75	38.5	23.2	59.75	37.0
23.4	31.40	26.9	24.3	23.68	35.4	24.3	12.31	38.6	24.2	59.34	36.8
24.4	31.34	27.2	25.3	23.31	35.6	25.3	11.84	38.7	25.2	58.93	36.7
25.4	31.26	27.5	26.3	22.92	35.8	26.3	11.37	38.7	26.2	58.54	36.5
26.4	31.17	27.9	27.3	22.50	36.0	27.3	10.87	38.8	27.2	58.19	36.3
27.4	31.05	28.2	28.3	22.06	36.2	28.3	10.39	38.8	28.2	57.86	36.1
28.4	30.89	28.5	29.3	21.63	36.3	29.3	9.91	38.7	29.2	57.55	35.9
29.4	30.69	28.9	30.3	21.21	36.5	30.3	9.46	38.7	30.2	57.26	35.7
30.4	30.47	29.2	31.3	20.81	36.6	31.2	9.03	38.6	31.2	56.98	35.5
31.4	30.22	29.5	32.3	20.44	36.7	32.2	8.63	38.6	32.2	56.70	35.4

APPARENT PLACES OF 51 CEPHEI, (*Hec.*) FOR THE UPPER TRANSIT  
AT WASHINGTON.

Mean Solar Date.	MAY.		Mean Solar Date.	JUNE.		Mean Solar Date.	JULY.		Mean Solar Date.	AUGUST.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sup>m</sup> 6 37	<sup>°</sup> 87 14'		<sup>h</sup> <sup>m</sup> 6 37	<sup>°</sup> 87 14'		<sup>h</sup> <sup>m</sup> 6 37	<sup>°</sup> 87 14'		<sup>h</sup> <sup>m</sup> 6 37	<sup>°</sup> 87 14'
1.2	56.98	35.5	1.1	49.83	28.3	1.0	49.53	19.4	1.9	56.66	10.2
2.2	56.70	35.4	2.1	49.67	28.1	2.0	49.58	19.1	2.9	57.03	9.9
3.2	56.40	35.2	3.1	49.51	27.8	3.0	49.66	18.8	3.9	57.43	9.7
4.2	56.09	35.1	4.1	49.34	27.5	4.0	49.78	18.4	4.9	57.83	9.4
5.2	55.76	34.9	5.1	49.20	27.2	5.0	49.92	18.1	5.9	58.22	9.2
6.2	55.41	34.8	6.1	49.07	26.9	6.0	50.10	17.7	6.9	58.60	9.0
7.1	55.06	34.6	7.1	48.99	26.5	7.0	50.30	17.4	7.9	58.96	8.8
8.1	54.71	34.3	8.1	48.94	26.2	8.0	50.50	17.1	8.9	59.30	8.6
9.1	54.38	34.1	9.1	48.92	25.9	9.0	50.71	16.8	9.9	59.63	8.4
10.1	54.08	33.9	10.1	48.93	25.6	10.0	50.92	16.6	10.9	59.95	8.2
11.1	53.80	33.6	11.1	48.93	25.3	11.0	51.12	16.3	11.9	60.29	8.0
12.1	53.56	33.3	12.1	48.93	25.0	12.0	51.30	16.1	12.9	60.64	7.7
13.1	53.34	33.1	13.0	48.92	24.8	13.0	51.47	15.8	13.9	61.02	7.5
14.1	53.14	32.9	14.0	48.89	24.5	14.0	51.63	15.5	14.9	61.42	7.2
15.1	52.94	32.6	15.0	48.85	24.2	15.0	51.78	15.2	15.9	61.85	7.0
16.1	52.74	32.4	16.0	48.80	24.0	16.0	51.95	14.9	16.9	62.31	6.7
17.1	52.51	32.2	17.0	48.74	23.7	17.0	52.13	14.6	17.9	62.78	6.5
18.1	52.28	32.0	18.0	48.69	23.4	18.0	52.35	14.3	18.9	63.25	6.3
19.1	52.03	31.8	19.0	48.65	23.0	18.9	52.61	14.0	19.9	63.71	6.2
20.1	51.77	31.6	20.0	48.65	22.7	19.9	52.90	13.7	20.9	64.16	6.0
21.1	51.50	31.3	21.0	48.68	22.3	20.9	53.20	13.4	21.9	64.59	5.9
22.1	51.25	31.1	22.0	48.75	22.0	21.9	53.52	13.1	22.9	64.98	5.7
23.1	51.02	30.8	23.0	48.85	21.7	22.9	53.84	12.8	23.9	65.37	5.6
24.1	50.81	30.5	24.0	48.97	21.4	23.9	54.15	12.6	24.8	65.76	5.4
25.1	50.65	30.2	25.0	49.08	21.1	24.9	54.43	12.4	25.8	66.16	5.2
26.1	50.51	29.9	26.0	49.19	20.8	25.9	54.71	12.1	26.8	66.59	5.0
27.1	50.40	29.6	27.0	49.29	20.5	26.9	54.95	11.9	27.8	67.03	4.8
28.1	50.30	29.3	28.0	49.37	20.3	27.9	55.19	11.6	28.8	67.51	4.6
29.1	50.20	29.0	29.0	49.43	20.0	28.9	55.43	11.4	29.8	68.01	4.4
30.1	50.09	28.8	30.0	49.48	19.7	29.9	55.70	11.1	30.8	68.54	4.2
31.1	49.98	28.6	31.0	49.53	19.4	30.9	55.99	10.8	31.8	69.06	4.1
32.1	49.83	28.3	32.0	49.58	19.1	31.9	56.31	10.5	32.8	69.59	3.9

APPARENT PLACES OF 51 CEPHEI, (*Hev.*) FOR THE UPPER TRANSIT  
AT WASHINGTON.

Mean Solar Date.	SEPTEMBER.		Mean Solar Date.	OCTOBER.		Mean Solar Date.	NOVEMBER.		Mean Solar Date.	DECEMBER.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sup>m</sup> 6 38	<sup>°</sup> <sup>'</sup> 87 14		<sup>h</sup> <sup>m</sup> 6 38	<sup>°</sup> <sup>'</sup> 87 14		<sup>h</sup> <sup>m</sup> 6 38	<sup>°</sup> <sup>'</sup> 87 14		<sup>h</sup> <sup>m</sup> 6 38	<sup>°</sup> <sup>'</sup> 87 14
1.8	<sup>s</sup> 9.59	<sup>"</sup> 3.9	1.7	<sup>s</sup> 25.09	<sup>"</sup> 1.6	1.7	<sup>s</sup> 41.17	<sup>"</sup> 3.6	1.6	<sup>s</sup> 53.81	<sup>"</sup> 9.6
2.8	10.11	3.8	2.7	25.60	1.6	2.7	41.61	3.7	2.6	54.16	9.8
3.8	10.60	3.7	3.7	26.09	1.6	3.7	42.08	3.8	3.6	54.52	10.1
4.8	11.07	3.6	4.7	26.57	1.6	4.7	42.56	3.9	4.6	54.89	10.3
5.8	11.52	3.5	5.7	27.06	1.6	5.6	43.06	4.0	5.6	55.26	10.6
6.8	11.95	3.4	6.7	27.56	1.6	6.6	43.59	4.2	6.6	55.62	10.9
7.8	12.40	3.3	7.7	28.08	1.6	7.6	44.12	4.3	7.6	55.95	11.2
8.8	12.85	3.1	8.7	28.63	1.6	8.6	44.64	4.5	8.6	56.24	11.5
9.8	13.32	3.0	9.7	29.20	1.5	9.6	45.14	4.7	9.6	56.51	11.9
10.8	13.82	2.8	10.7	29.78	1.6	10.6	45.62	4.9	10.6	56.74	12.2
11.8	14.35	2.7	11.7	30.38	1.6	11.6	46.08	5.1	11.6	56.96	12.5
12.8	14.90	2.6	12.7	30.96	1.6	12.6	46.50	5.4	12.5	57.16	12.8
13.8	15.46	2.5	13.7	31.52	1.7	13.6	46.89	5.6	13.5	57.37	13.1
14.8	16.03	2.4	14.7	32.07	1.8	14.6	47.28	5.8	14.5	57.59	13.3
15.8	16.60	2.3	15.7	32.58	1.9	15.6	47.66	6.0	15.5	57.83	13.6
16.8	17.14	2.3	16.7	33.07	2.0	16.6	48.05	6.1	16.5	58.08	13.9
17.8	17.66	2.2	17.7	33.55	2.1	17.6	48.47	6.3	17.5	58.34	14.1
18.8	18.16	2.2	18.7	34.02	2.1	18.6	48.89	6.5	18.5	58.61	14.4
19.8	18.63	2.1	19.7	34.51	2.2	19.6	49.34	6.6	19.5	58.87	14.8
20.8	19.10	2.1	20.7	34.99	2.2	20.6	49.80	6.9	20.5	59.11	15.1
21.8	19.57	2.0	21.7	35.51	2.3	21.6	50.26	7.1	21.5	59.32	15.5
22.8	20.06	1.9	22.7	36.04	2.3	22.6	50.71	7.3	22.5	59.50	15.8
23.8	20.57	1.8	23.7	36.60	2.4	23.6	51.14	7.6	23.5	59.63	16.2
24.8	21.10	1.7	24.7	37.18	2.5	24.6	51.55	7.9	24.5	59.74	16.5
25.8	21.66	1.7	25.7	37.74	2.6	25.6	51.91	8.1	25.5	59.83	16.8
26.8	22.23	1.6	26.7	38.30	2.7	26.6	52.25	8.4	26.5	59.92	17.2
27.8	22.82	1.6	27.7	38.84	2.9	27.6	52.56	8.7	27.5	60.01	17.5
28.8	23.41	1.6	28.7	39.35	3.0	28.6	52.86	8.9	28.5	60.11	17.7
29.8	24.00	1.6	29.7	39.83	3.2	29.6	53.17	9.2	29.5	60.23	18.0
30.7	24.55	1.6	30.7	40.29	3.3	30.6	53.48	9.4	30.5	60.37	18.3
31.7	25.09	1.6	31.7	40.73	3.5	31.6	53.81	9.6	31.5	60.52	18.6
32.7	25.60	1.6	32.7	41.17	3.6	32.6	54.16	9.8	32.5	60.67	19.0



**APPARENT PLACES OF  $\delta$  URSÆ MINORIS, FOR THE UPPER TRANSIT  
AT WASHINGTON.**

Mean Solar Date.	JANUARY.		Mean Solar Date.	FEBRUARY.		Mean Solar Date.	MARCH.		Mean Solar Date.	APRIL.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> 18 14	<sup>m</sup> 86 36		<sup>h</sup> 18 14	<sup>m</sup> 86 36		<sup>h</sup> 18 14	<sup>m</sup> 86 36		<sup>h</sup> 18 14	<sup>m</sup> 86 36
1.0	17.75	23.5	1.9	21.21	13.1	1.8	29.14	7.1	1.7	40.19	5.9
2.0	17.75	23.1	2.9	21.46	12.9	2.8	29.49	7.0	2.7	40.50	5.9
3.0	17.78	22.8	3.9	21.69	12.6	3.8	29.82	6.9	3.7	40.83	6.0
4.0	17.82	22.4	4.9	21.91	12.4	4.8	30.14	6.8	4.7	41.15	6.0
5.0	17.87	22.1	5.9	22.11	12.1	5.8	30.46	6.7	5.7	41.47	6.1
6.0	17.90	21.8	6.9	22.32	11.9	6.8	30.78	6.6	6.7	41.82	6.1
7.0	17.95	21.5	7.9	22.52	11.6	7.8	31.09	6.5	7.7	42.19	6.2
8.0	17.99	21.1	8.9	22.74	11.3	8.8	31.42	6.3	8.7	42.57	6.3
9.0	18.02	20.8	9.9	22.97	11.1	9.8	31.76	6.2	9.7	42.95	6.3
10.0	18.05	20.5	10.9	23.23	10.8	10.8	32.13	6.1	10.7	43.32	6.4
11.0	18.07	20.2	11.9	23.52	10.5	11.8	32.51	6.0	11.7	43.69	6.6
11.9	18.11	19.8	12.9	23.81	10.2	12.8	32.90	5.9	12.7	44.02	6.7
12.9	18.16	19.5	13.9	24.13	10.0	13.8	33.30	5.8	13.7	44.34	6.9
13.9	18.23	19.1	14.9	24.43	9.8	14.8	33.69	5.8	14.7	44.65	7.1
14.9	18.33	18.7	15.9	24.74	9.6	15.8	34.08	5.7	15.7	44.94	7.2
15.9	18.44	18.4	16.9	25.05	9.4	16.8	34.44	5.7	16.7	45.22	7.4
16.9	18.57	18.0	17.8	25.35	9.2	17.8	34.80	5.7	17.7	45.50	7.5
17.9	18.71	17.7	18.8	25.63	9.1	18.8	35.14	5.7	18.7	45.79	7.6
18.9	18.87	17.4	19.8	25.90	8.9	19.8	35.47	5.7	19.7	46.09	7.7
19.9	19.03	17.1	20.8	26.17	8.7	20.8	35.80	5.7	20.7	46.41	7.9
20.9	19.17	16.8	21.8	26.44	8.5	21.8	36.13	5.6	21.7	46.74	8.0
21.9	19.30	16.5	22.8	26.74	8.3	22.8	36.48	5.6	22.7	47.07	8.1
22.9	19.42	16.2	23.8	27.04	8.1	23.8	36.83	5.5	23.7	47.40	8.3
23.9	19.54	15.9	24.8	27.35	7.9	24.8	37.19	5.5	24.7	47.72	8.5
24.9	19.66	15.6	25.8	27.69	7.7	25.7	37.59	5.5	25.7	48.02	8.7
25.9	19.79	15.3	26.8	28.05	7.5	26.7	37.98	5.5	26.7	48.31	9.0
26.9	19.93	15.0	27.8	28.42	7.3	27.7	38.39	5.5	27.7	48.58	9.2
27.9	20.10	14.6	28.8	28.78	7.2	28.7	38.77	5.6	28.7	48.84	9.4
28.9	20.30	14.3	29.8	29.14	7.1	29.7	39.15	5.6	29.7	49.08	9.6
29.9	20.51	14.0	30.8	29.49	7.0	30.7	39.51	5.7	30.7	49.31	9.8
30.9	20.74	13.6	31.8	29.82	6.9	31.7	39.85	5.8	31.6	49.55	10.0
31.9	20.97	13.4	32.8	30.14	6.8	32.7	40.19	5.9	32.6	49.79	10.2

APPARENT PLACES OF  $\delta$  URSÆ MINORIS, FOR THE UPPER TRANSIT  
AT WASHINGTON.

Mean Solar Date.	MAY.		Mean Solar Date.	JUNE.		Mean Solar Date.	JULY.		Mean Solar Date.	AUGUST.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sup>m</sup> 18 14	<sup>°</sup> <sup>'</sup> 86 36		<sup>h</sup> <sup>m</sup> 18 14	<sup>°</sup> <sup>'</sup> 86 36		<sup>h</sup> <sup>m</sup> 18 14	<sup>°</sup> <sup>'</sup> 86 36		<sup>h</sup> <sup>m</sup> 18 14	<sup>°</sup> <sup>'</sup> 86 36
1.6	49.55	10.0	1.6	54.91	18.2	1.5	54.53	27.6	1.4	48.40	36.3
2.6	49.79	10.2	2.6	55.01	18.5	2.5	54.45	27.9	2.4	48.09	36.6
3.6	50.02	10.4	3.6	55.11	18.8	3.5	54.35	28.2	3.4	47.76	36.8
4.6	50.26	10.6	4.6	55.22	19.1	4.5	54.22	28.6	4.4	47.44	37.0
5.6	50.53	10.8	5.6	55.30	19.4	5.5	54.07	28.9	5.4	47.11	37.2
6.6	50.79	11.0	6.6	55.36	19.8	6.5	53.90	29.2	6.4	46.79	37.4
7.6	51.06	11.3	7.5	55.39	20.1	7.5	53.73	29.6	7.4	46.47	37.6
8.6	51.32	11.5	8.5	55.41	20.5	8.5	53.54	29.8	8.4	46.17	37.8
9.6	51.56	11.8	9.5	55.41	20.8	9.5	53.36	30.1	9.4	45.89	38.0
10.6	51.77	12.1	10.5	55.40	21.1	10.5	53.18	30.4	10.4	45.59	38.2
11.6	51.97	12.4	11.5	55.39	21.4	11.5	53.01	30.6	11.4	45.31	38.4
12.6	52.14	12.7	12.5	55.39	21.8	12.5	52.86	30.9	12.4	45.01	38.6
13.6	52.30	12.9	13.5	55.39	22.0	13.4	52.71	31.2	13.4	44.70	38.9
14.6	52.47	13.2	14.5	55.40	22.3	14.4	52.57	31.4	14.4	44.37	39.1
15.6	52.62	13.4	15.5	55.40	22.5	15.4	52.41	31.7	15.4	44.00	39.3
16.6	52.78	13.7	16.5	55.43	22.8	16.4	52.25	32.1	16.4	43.64	39.5
17.6	52.96	13.9	17.5	55.44	23.2	17.4	52.05	32.4	17.4	43.25	39.7
18.6	53.15	14.1	18.5	55.45	23.5	18.4	51.83	32.7	18.4	42.87	39.9
19.6	53.34	14.4	19.5	55.44	23.8	19.4	51.60	33.0	19.3	42.49	40.0
20.6	53.53	14.6	20.5	55.41	24.2	20.4	51.35	33.3	20.3	42.12	40.3
21.6	53.72	14.9	21.5	55.36	24.6	21.4	51.09	33.6	21.3	41.76	40.3
22.6	53.89	15.2	22.5	55.27	24.9	22.4	50.83	33.8	22.3	41.42	40.4
23.6	54.04	15.6	23.5	55.18	25.2	23.4	50.58	34.0	23.3	41.08	40.6
24.6	54.18	15.9	24.5	55.08	25.5	24.4	50.34	34.3	24.3	40.75	40.7
25.6	54.29	16.2	25.5	54.98	25.8	25.4	50.11	34.5	25.3	40.41	40.9
26.6	54.39	16.5	26.5	54.89	26.1	26.4	49.89	34.7	26.3	40.06	41.0
27.6	54.46	16.8	27.5	54.80	26.4	27.4	49.66	34.9	27.3	39.69	41.2
28.6	54.54	17.1	28.5	54.73	26.7	28.4	49.43	35.2	28.3	39.30	41.4
29.6	54.61	17.4	29.5	54.66	26.9	29.4	49.20	35.5	29.3	38.91	41.6
30.6	54.70	17.7	30.5	54.60	27.2	30.4	48.96	35.8	30.3	38.48	41.7
31.6	54.80	17.9	31.5	54.53	27.6	31.4	48.69	36.0	31.3	38.05	41.8
32.6	54.91	18.2	32.5	54.45	27.9	32.4	48.40	36.3	32.3	37.63	41.9

## APPARENT PLACES OF $\delta$ URSÆ MINORIS, FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	SEPTEMBER.		Mean Solar Date.	OCTOBER.		Mean Solar Date.	NOVEMBER.		Mean Solar Date.	DECEMBER.		
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.	
	<sup>h</sup> 18	<sup>m</sup> 14	<sup>°</sup> 86	<sup>h</sup> 18	<sup>m</sup> 14	<sup>°</sup> 86	<sup>h</sup> 18	<sup>m</sup> 14	<sup>°</sup> 86	<sup>h</sup> 18	<sup>m</sup> 13	<sup>°</sup> 86
	<sup>s</sup>	<sup>"</sup>		<sup>s</sup>	<sup>"</sup>		<sup>s</sup>	<sup>"</sup>		<sup>s</sup>	<sup>"</sup>	
1.3	37.63	41.9	1.2	25.07	43.2	1.1	12.58	39.9	1.1	63.49	32.6	
2.3	37.21	42.0	2.2	24.66	43.2	2.1	12.24	39.7	2.1	63.26	32.4	
3.3	36.80	42.1	3.2	24.27	43.1	3.1	11.90	39.6	3.1	63.02	32.1	
4.3	36.40	42.2	4.2	23.86	43.1	4.1	11.54	39.4	4.1	62.78	31.8	
5.3	36.02	42.2	5.2	23.47	43.0	5.1	11.17	39.3	5.1	62.55	31.5	
6.3	35.65	42.3	6.2	23.07	43.0	6.1	10.79	39.1	6.1	62.32	31.2	
7.3	35.29	42.4	7.2	22.67	43.0	7.1	10.41	38.9	7.0	62.11	30.8	
8.3	34.91	42.5	8.2	22.25	43.0	8.1	10.02	38.7	8.0	61.92	30.5	
9.3	34.51	42.6	9.2	21.81	42.9	9.1	9.64	38.4	9.0	61.74	30.1	
10.3	34.11	42.7	10.2	21.36	42.9	10.1	9.28	38.2	10.0	61.58	29.8	
11.3	33.69	42.9	11.2	20.90	42.8	11.1	8.95	37.9	11.0	61.44	29.4	
12.3	33.26	43.0	12.2	20.44	42.7	12.1	8.64	37.7	12.0	61.32	29.1	
13.3	32.81	43.0	13.2	20.00	42.6	13.1	8.33	37.4	13.0	61.19	28.8	
14.3	32.36	43.1	14.2	19.58	42.5	14.1	8.05	37.2	14.0	61.07	28.5	
15.3	31.91	43.2	15.2	19.18	42.3	15.1	7.76	36.9	15.0	60.94	28.2	
16.3	31.46	43.1	16.2	18.79	42.2	16.1	7.48	36.7	16.0	60.79	27.9	
17.3	31.03	43.1	17.2	18.41	42.1	17.1	7.19	36.5	17.0	60.64	27.6	
18.3	30.62	43.2	18.2	18.03	42.0	18.1	6.89	36.3	18.0	60.48	27.2	
19.3	30.23	43.2	19.2	17.67	41.9	19.1	6.58	36.1	19.0	60.34	26.9	
20.3	29.83	43.2	20.2	17.29	41.8	20.1	6.27	35.8	20.0	60.23	26.5	
21.3	29.45	43.2	21.2	16.89	41.7	21.1	5.95	35.6	21.0	60.12	26.2	
22.3	29.05	43.2	22.2	16.47	41.6	22.1	5.63	35.3	22.0	60.03	25.8	
23.3	28.64	43.3	23.2	16.05	41.5	23.1	5.34	35.0	23.0	59.95	25.4	
24.3	28.22	43.4	24.2	15.63	41.4	24.1	5.05	34.7	24.0	59.91	25.0	
25.2	27.78	43.4	25.2	15.20	41.2	25.1	4.79	34.4	25.0	59.87	24.7	
26.2	27.33	43.4	26.2	14.78	41.1	26.1	4.56	34.0	26.0	59.85	24.3	
27.2	26.86	43.4	27.2	14.37	40.9	27.1	4.34	33.7	27.0	59.83	24.0	
28.2	26.41	43.4	28.2	13.98	40.7	28.1	4.14	33.4	28.0	59.80	23.7	
29.2	25.95	43.4	29.2	13.60	40.5	29.1	3.92	33.2	29.0	59.77	23.4	
30.2	25.50	43.3	30.2	13.25	40.3	30.1	3.71	32.9	30.0	59.72	23.1	
31.2	25.07	43.2	31.2	12.92	40.1	31.1	3.49	32.6	31.0	59.68	22.7	
32.2	24.66	43.2	32.1	12.58	39.9	32.1	3.26	32.4	32.0	59.63	22.4	

APPARENT PLACES OF  $\lambda$  URSÆ MINORIS, FOR THE UPPER TRANSIT  
AT WASHINGTON.

Mean Solar Date.	JANUARY.		Mean Solar Date.	FEBRUARY.		Mean Solar Date.	MARCH.		Mean Solar Date.	APRIL.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sup>m</sup> 19 54	<sup>°</sup> <sup>'</sup> 88 54		<sup>h</sup> <sup>m</sup> 19 54	<sup>°</sup> <sup>'</sup> 88 54		<sup>h</sup> <sup>m</sup> 19 54	<sup>°</sup> <sup>'</sup> 88 54		<sup>h</sup> <sup>m</sup> 19 55	<sup>°</sup> <sup>'</sup> 88 54
1.1	<sup>s</sup> 32.57	<sup>"</sup> 65.7	1.0	<sup>s</sup> 26.56	<sup>"</sup> 55.5	1.9	<sup>s</sup> 40.16	<sup>"</sup> 46.9	1.8	<sup>s</sup> 9.31	<sup>"</sup> 41.7
2.1	32.04	65.3	2.0	26.86	55.2	2.9	41.00	46.7	2.8	10.29	41.6
3.1	31.58	65.0	3.0	27.16	54.9	3.9	41.80	46.5	3.8	11.24	41.6
4.1	31.19	64.7	4.0	27.43	54.6	4.9	42.56	46.3	4.8	12.20	41.5
5.0	30.84	64.4	5.0	27.68	54.3	5.9	43.29	46.0	5.8	13.19	41.4
6.0	30.52	64.1	6.0	27.89	54.0	6.9	43.99	45.8	6.8	14.22	41.3
7.0	30.19	63.8	7.0	28.08	53.7	7.9	44.69	45.6	7.8	15.32	41.2
8.0	29.83	63.5	8.0	28.26	53.4	8.9	45.42	45.4	8.8	16.47	41.1
9.0	29.43	63.2	8.9	28.46	53.1	9.9	46.18	45.1	9.8	17.67	41.1
10.0	29.00	62.9	9.9	28.69	52.7	10.9	47.02	44.9	10.8	18.90	41.0
11.0	28.54	62.6	10.9	28.99	52.4	11.9	47.92	44.6	11.8	20.12	41.0
12.0	28.09	62.3	11.9	29.36	52.0	12.9	48.90	44.4	12.8	21.32	41.1
13.0	27.66	62.0	12.9	29.82	51.7	13.9	49.93	44.2	13.8	22.46	41.1
14.0	27.30	61.6	13.9	30.35	51.3	14.9	50.98	44.0	14.8	23.54	41.1
15.0	27.02	61.2	14.9	30.92	51.0	15.9	52.01	43.8	15.8	24.57	41.1
16.0	26.81	60.9	15.9	31.52	50.7	16.8	53.02	43.7	16.8	25.56	41.2
17.0	26.68	60.5	16.9	32.11	50.5	17.8	53.99	43.6	17.8	26.52	41.2
18.0	26.61	60.1	17.9	32.68	50.2	18.8	54.92	43.4	18.8	27.49	41.2
19.0	26.57	59.8	18.9	33.20	50.0	19.8	55.81	43.3	19.8	28.49	41.2
20.0	26.54	59.5	19.9	33.69	49.7	20.8	56.69	43.2	20.8	29.55	41.2
21.0	26.52	59.2	20.9	34.16	49.4	21.8	57.56	43.0	21.7	30.65	41.2
22.0	26.46	58.9	21.9	34.62	49.2	22.8	58.46	42.8	22.7	31.80	41.2
23.0	26.38	58.6	22.9	35.11	48.9	23.8	59.40	42.6	23.7	32.99	41.2
24.0	26.26	58.3	23.9	35.64	48.6	24.8	60.40	42.5	24.7	34.18	41.3
25.0	26.14	58.0	24.9	36.23	48.3	25.8	61.46	42.3	25.7	35.36	41.3
26.0	26.01	57.6	25.9	36.90	47.9	26.8	62.59	42.2	26.7	36.50	41.4
27.0	25.91	57.3	26.9	37.65	47.7	27.8	63.74	42.0	27.7	37.58	41.5
28.0	25.88	56.9	27.9	38.45	47.4	28.8	64.90	41.9	28.7	38.60	41.7
29.0	25.94	56.6	28.9	39.31	47.1	29.8	66.08	41.9	29.7	39.56	41.8
30.0	26.09	56.2	29.9	40.16	46.9	30.8	67.21	41.8	30.7	40.47	41.9
31.0	26.29	55.8	30.9	41.00	46.7	31.8	68.29	41.7	31.7	41.38	42.0
32.0	26.56	55.5	31.9	41.80	46.5	32.8	69.31	41.7	32.7	42.28	42.0

**APPARENT PLACES OF  $\lambda$  URSÆ MINORIS, FOR THE UPPER TRANSIT  
AT WASHINGTON.**

Mean Solar Date.	MAY.		Mean Solar Date.	JUNE.		Mean Solar Date.	JULY.		Mean Solar Date.	AUGUST.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sub>19</sub> <sup>m</sup> <sub>55</sub>	<sup>°</sup> <sub>88</sub> <sup>'</sup> <sub>54</sub>		<sup>h</sup> <sub>19</sub> <sup>m</sup> <sub>56</sub>	<sup>°</sup> <sub>88</sub> <sup>'</sup> <sub>54</sub>		<sup>h</sup> <sub>19</sub> <sup>m</sup> <sub>56</sub>	<sup>°</sup> <sub>88</sub> <sup>'</sup> <sub>54</sub>		<sup>h</sup> <sub>19</sub> <sup>m</sup> <sub>55</sub>	<sup>°</sup> <sub>88</sub> <sup>'</sup> <sub>55</sub>
1.7	41.38	42.0	1.6	7.91	47.3	1.6	20.10	55.9	1.5	75.06	6.1
2.7	42.28	42.0	2.6	8.63	47.5	2.6	20.34	56.2	2.5	74.56	6.5
3.7	43.23	42.1	3.6	9.39	47.7	3.6	20.54	56.6	3.5	73.99	6.8
4.7	44.22	42.2	4.6	10.14	48.0	4.6	20.68	56.9	4.5	73.37	7.2
5.7	45.26	42.3	5.6	10.86	48.3	5.5	20.74	57.3	5.5	72.72	7.5
6.7	46.34	42.3	6.6	11.53	48.6	6.5	20.72	57.7	6.5	72.07	7.8
7.7	47.44	42.5	7.6	12.13	48.9	7.5	20.64	58.0	7.5	71.43	8.0
8.7	48.53	42.6	8.6	12.66	49.2	8.5	20.50	58.3	8.5	70.84	8.3
9.7	49.61	42.8	9.6	13.11	49.5	9.5	20.36	58.6	9.4	70.28	8.6
10.7	50.63	42.9	10.6	13.52	49.8	10.5	20.22	58.9	10.4	69.77	8.9
11.7	51.58	43.1	11.6	13.89	50.0	11.5	20.11	59.2	11.4	69.27	9.2
12.7	52.46	43.3	12.6	14.24	50.3	12.5	20.04	59.5	12.4	68.75	9.5
13.7	53.29	43.5	13.6	14.62	50.5	13.5	20.02	59.8	13.4	68.21	9.8
14.7	54.08	43.7	14.6	15.05	50.8	14.5	20.01	60.1	14.4	67.60	10.2
15.7	54.85	43.8	15.6	15.51	51.0	15.5	20.01	60.5	15.4	66.92	10.5
16.7	55.63	44.0	16.6	16.00	51.3	16.5	19.98	60.8	16.4	66.16	10.8
17.7	56.45	44.1	17.6	16.51	51.6	17.5	19.89	61.2	17.4	65.33	11.2
18.7	57.31	44.3	18.6	17.01	51.9	18.5	19.73	61.5	18.4	64.46	11.5
19.7	58.21	44.4	19.6	17.47	52.2	19.5	19.50	61.9	19.4	63.58	11.7
20.7	59.14	44.6	20.6	17.88	52.5	20.5	19.20	62.3	20.4	62.71	12.0
21.7	60.08	44.8	21.6	18.22	52.9	21.5	18.84	62.6	21.4	61.86	12.2
22.7	61.02	45.0	22.6	18.48	53.2	22.5	18.44	62.9	22.4	61.07	12.5
23.7	61.92	45.2	23.6	18.67	53.5	23.5	18.04	63.2	23.4	60.32	12.7
24.7	62.75	45.5	24.6	18.82	53.9	24.5	17.64	63.5	24.4	59.59	13.0
25.7	63.51	45.7	25.6	18.94	54.2	25.5	17.28	63.8	25.4	58.87	13.3
26.7	64.20	46.0	26.6	19.06	54.4	26.5	16.95	64.1	26.4	58.12	13.6
27.7	64.83	46.2	27.6	19.21	54.7	27.5	16.67	64.4	27.4	57.34	13.9
28.6	65.43	46.5	28.6	19.38	55.0	28.5	16.41	64.7	28.4	56.49	14.2
29.6	66.01	46.7	29.6	19.60	55.3	29.5	16.14	65.1	29.4	55.58	14.5
30.6	66.61	46.9	30.6	19.85	55.6	30.5	15.84	65.4	30.4	54.59	14.8
31.6	67.24	47.1	31.6	20.10	55.9	31.5	15.49	65.8	31.4	53.54	15.1
32.6	67.91	47.3	32.6	20.34	56.2	32.5	15.06	66.1	32.4	52.45	15.3

APPARENT PLACES OF  $\lambda$  URSÆ MINORIS, FOR THE UPPER TRANSIT  
AT WASHINGTON.

Mean Solar Date.	SEPTEMBER.		Mean Solar Date.	OCTOBER.		Mean Solar Date.	NOVEMBER.		Mean Solar Date.	DECEMBER.	
	Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.		Right Ascen- sion.	Declina- tion North.
	<sup>h</sup> <sup>m</sup> 19 55	88° 55'		<sup>h</sup> <sup>m</sup> 19 54	88° 55'		<sup>h</sup> <sup>m</sup> 19 53	88° 55'		<sup>h</sup> <sup>m</sup> 19 53	88° 55'
1.4	52.45	15.3	1.3	78.38	21.3	1.2	97.53	23.1	1.1	60.51	20.1
2.4	51.37	15.6	2.3	77.11	21.4	2.2	96.32	23.1	2.1	59.45	20.0
3.4	50.30	15.8	3.3	75.90	21.5	3.2	95.10	23.1	3.1	58.35	19.8
4.4	49.28	16.0	4.3	74.72	21.6	4.2	93.85	23.1	4.1	57.22	19.7
5.4	48.30	16.2	5.3	73.55	21.7	5.2	92.55	23.1	5.1	56.06	19.5
6.4	47.35	16.4	6.3	72.37	21.8	6.2	91.19	23.1	6.1	54.89	19.3
7.4	46.44	16.6	7.3	71.17	22.0	7.2	89.79	23.1	7.1	53.76	19.1
8.4	45.53	16.9	8.3	69.92	22.1	8.2	88.36	23.0	8.1	52.66	18.8
9.4	44.59	17.1	9.3	68.60	22.3	9.2	86.92	23.0	9.1	51.63	18.6
10.4	43.61	17.4	10.3	67.23	22.4	10.2	85.51	22.9	10.1	50.66	18.3
11.4	42.56	17.6	11.3	65.80	22.5	11.2	84.16	22.8	11.1	49.77	18.1
12.4	41.44	17.9	12.3	64.36	22.6	12.2	82.86	22.6	12.1	48.94	17.8
13.4	40.26	18.1	13.3	62.91	22.7	13.2	81.63	22.5	13.1	48.14	17.6
14.3	39.03	18.4	14.3	61.51	22.7	14.2	80.45	22.4	14.1	47.34	17.4
15.3	37.79	18.6	15.3	60.12	22.7	15.2	79.30	22.3	15.1	46.52	17.2
16.3	36.55	18.7	16.3	58.80	22.8	16.2	78.17	22.2	16.1	45.65	16.9
17.3	35.34	18.9	17.3	57.53	22.8	17.2	77.02	22.1	17.1	44.75	16.7
18.3	34.17	19.1	18.3	56.30	22.8	18.2	75.83	22.1	18.1	43.81	16.5
19.3	33.05	19.2	19.3	55.09	22.9	19.2	74.59	22.0	19.1	42.87	16.3
20.3	31.97	19.4	20.3	53.87	23.0	20.2	73.30	21.9	20.1	41.94	16.0
21.3	30.91	19.6	21.2	52.61	23.0	21.2	71.98	21.8	21.1	41.04	15.7
22.3	29.84	19.7	22.2	51.30	23.1	22.2	70.64	21.7	22.1	40.20	15.4
23.3	28.75	19.9	23.2	49.95	23.2	23.2	69.32	21.5	23.1	39.44	15.1
24.3	27.61	20.2	24.2	48.51	23.2	24.2	68.03	21.3	24.1	38.75	14.8
25.3	26.41	20.4	25.2	47.05	23.3	25.2	66.81	21.2	25.1	38.14	14.5
26.3	25.14	20.6	26.2	45.57	23.3	26.1	65.66	21.0	26.1	37.57	14.2
27.3	23.82	20.7	27.2	44.10	23.3	27.1	64.58	20.8	27.1	37.01	13.9
28.3	22.46	20.9	28.2	42.68	23.3	28.1	63.54	20.6	28.1	36.48	13.6
29.3	21.08	21.1	29.2	41.32	23.2	29.1	62.54	20.4	29.1	35.90	13.4
30.3	19.71	21.2	30.2	40.01	23.2	30.1	61.53	20.3	30.1	35.29	13.1
31.3	18.38	21.3	31.2	38.75	23.1	31.1	60.51	20.1	31.1	34.65	12.9
32.3	17.11	21.4	32.2	37.53	23.1	32.1	59.45	20.0	32.1	34.00	12.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Andromedæ.			$\gamma$ Pegasi. (Algenib.)			$\beta$ Hydri.			$\alpha$ Cassiopeiæ.		
	Right Ascension.		Declination North.	Right Ascension.		Declination North.	Right Ascension.		Declination South.	Right Ascension.		Declination North.
	h 0	m 1	° 28 21'	h 0	m 6	° 14 27'	h 0	m 18	° 77 59'	h 0	m 33	° 55 48'
Jan. 0.2	36.55	-.15	66.3 -0.9	28.79	-.12	17.8 -0.8	46.18	-.91	59.8 -0.9	5.24	-.30	77.4 -0.3
10.2	36.40	.14	65.3 1.1	28.67	.12	16.9 0.9	45.28	.86	58.7 1.4	4.95	.30	76.8 0.8
20.2	36.26	.13	64.0 1.4	28.55	.11	15.9 1.0	44.45	.79	57.1 1.9	4.65	.29	75.8 1.2
30.2	36.14	.12	62.6 1.5	28.44	.10	14.9 1.1	43.71	.69	54.9 2.4	4.37	.27	74.3 1.7
Feb. 9.1	36.03	.09	61.0 1.6	28.35	.08	13.8 1.1	43.08	.57	52.2 2.9	4.12	.23	72.5 2.0
19.1	35.95	.07	59.3 1.7	28.28	.05	12.7 1.0	42.56	.44	49.1 3.2	3.90	.19	70.3 2.3
Mar. 1.1	35.90	-.03	57.6 1.6	28.24	-.02	11.8 0.9	42.19	.30	45.8 3.5	3.74	.14	67.8 2.5
11.0	35.89	+.01	56.0 1.5	28.23	+.01	10.9 0.7	41.96	-.14	42.2 3.7	3.63	-.07	65.3 2.6
21.0	35.92	.05	54.6 1.3	28.26	.05	10.3 0.5	41.89	+.01	38.4 3.8	3.59	.00	62.7 2.5
31.0	35.99	.10	53.4 1.1	28.33	.09	9.9 -0.3	41.98	.17	34.6 3.8	3.63	+.07	60.2 2.4
Apr. 10.0	36.11	.14	52.5 0.7	28.44	.13	9.8 0.0	42.22	.32	30.8 3.7	3.74	.14	57.9 2.2
19.9	36.28	.19	51.9 -0.4	28.59	.17	10.0 +0.3	42.63	.48	27.1 3.6	3.92	.22	55.9 1.8
29.9	36.49	.23	51.7 0.0	28.78	.21	10.5 0.7	43.18	.62	23.6 3.4	4.17	.29	54.3 1.4
May 9.9	36.74	.27	51.9 +0.4	29.01	.24	11.3 1.0	43.88	.76	20.4 3.1	4.49	.34	53.0 1.0
19.9	37.02	.30	52.5 0.8	29.27	.27	12.4 1.3	44.70	.88	17.5 2.7	4.86	.39	52.3 -0.5
29.8	37.33	.32	53.4 1.1	29.55	.30	13.8 1.5	45.64	.98	15.0 2.3	5.27	.43	52.0 0.0
June 8.8	37.66	.33	54.8 1.5	29.86	.31	15.4 1.7	46.66	1.06	12.9 1.8	5.72	.46	52.2 +0.5
18.8	37.99	.33	56.4 1.8	30.17	.31	17.3 1.9	47.75	1.11	11.3 1.3	6.18	.47	52.9 1.0
28.7	38.33	.33	58.3 2.0	30.48	.31	19.3 2.0	48.88	1.13	10.3 0.8	6.66	.47	54.1 1.4
July 8.7	38.65	.32	60.5 2.2	30.79	.30	21.3 2.1	50.01	1.13	9.8 -0.2	7.12	.46	55.8 1.8
18.7	38.96	.30	62.8 2.4	31.08	.28	23.5 2.1	51.13	1.09	9.9 +0.4	7.57	.43	57.8 2.2
28.7	39.24	.27	65.2 2.5	31.36	.26	25.6 2.1	52.18	1.02	10.6 1.0	7.98	.40	60.2 2.5
Aug. 7.6	39.49	.23	67.7 2.5	31.60	.22	27.7 2.0	53.16	.92	11.8 1.5	8.36	.36	62.9 2.8
17.6	39.71	.20	70.2 2.4	31.81	.19	29.6 1.9	54.02	.79	13.5 2.0	8.69	.31	65.8 3.0
27.6	39.89	.16	72.6 2.4	31.98	.16	31.4 1.7	54.75	.64	15.7 2.4	8.98	.28	68.9 3.1
Sept. 6.6	40.02	.12	74.9 2.3	32.12	.12	33.1 1.5	55.31	.47	18.3 2.7	9.21	.20	72.0 3.2
16.5	40.12	.08	77.1 2.1	32.22	.08	34.5 1.3	55.69	.29	21.1 2.9	9.38	.14	75.3 3.2
26.5	40.17	+.04	79.1 1.9	32.28	.04	35.8 1.1	55.88	+.09	24.2 3.1	9.49	.09	78.5 3.2
Oct. 6.5	40.19	.00	80.9 1.7	32.30	+.01	36.8 0.9	55.88	-.10	27.3 3.1	9.55	+.03	81.6 3.0
16.4	40.17	+.03	82.5 1.4	32.30	-.02	37.5 0.7	55.68	.28	30.3 3.0	9.55	-.03	84.5 2.9
26.4	40.12	.06	83.8 1.2	32.26	.05	38.1 0.4	55.31	.45	33.2 2.7	9.50	.08	87.3 2.6
Nov. 5.4	40.05	.09	84.8 0.9	32.20	.07	38.4 +0.2	54.78	.80	35.8 2.4	9.40	.12	89.8 2.3
15.4	39.95	.11	85.5 0.6	32.12	.09	38.5 0.0	54.10	.73	37.9 1.9	9.25	.17	91.9 1.9
25.3	39.83	.12	85.9 +0.3	32.03	.10	38.4 -0.2	53.32	.82	39.6 1.4	9.06	.21	93.7 1.5
Dec. 5.3	39.70	.14	86.0 -0.1	31.92	.11	38.1 0.4	52.45	.89	40.8 0.8	8.84	.24	95.0 1.1
15.3	39.56	.14	85.8 0.4	31.80	.12	37.6 0.6	51.54	.92	41.3 +0.2	8.58	.27	95.8 0.6
25.3	39.42	.15	85.3 0.7	31.68	.12	37.0 0.7	50.61	.92	41.2 -0.4	8.31	.28	96.2 +0.1
35.2	39.27	-.15	84.4 -1.0	31.56	-.12	36.2 -0.9	49.70	-.89	40.5 -1.0	8.01	-.30	96.0 -0.4

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Ceti.		*21 Cassiopeæ.		$\epsilon$ Piscium.		$\theta^1$ Ceti.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 0 <sup>m</sup> 36	18° 42'	<sup>h</sup> 0 <sup>m</sup> 36	74° 15'	<sup>h</sup> 0 <sup>m</sup> 56	7° 10'	<sup>h</sup> 1 <sup>m</sup> 17	8° 51'
Jan. 0.3	59.89 -13	36.2 +0.6	63.42 -74	89.1 +0.2	8.30 -12	57.9 -0.7	28.04 -12	48.0 +0.6
10.2	59.76 .13	36.7 0.4	62.68 .73	88.9 -0.4	8.18 .12	57.2 0.7	27.92 .13	48.8 0.6
20.2	59.63 .12	36.9 +0.1	61.96 .70	88.2 1.0	8.05 .12	56.4 0.7	27.79 .13	49.3 0.5
30.2	59.51 .11	36.9 -0.2	61.28 .65	86.9 1.6	7.93 .12	55.7 0.7	27.66 .13	49.7 0.3
Feb. 9.2	59.40 .10	36.6 0.4	60.65 .58	85.0 2.1	7.81 .11	55.0 0.7	27.53 .12	49.9 +0.1
19.1	59.31 .08	36.1 0.7	60.12 .48	82.7 2.5	7.71 .09	54.4 0.6	27.41 .11	49.8 -0.2
Mar. 1.1	59.25 .05	35.2 1.0	59.70 .36	80.1 2.8	7.63 .07	53.9 0.4	27.32 .09	49.6 0.4
11.1	59.21 -0.2	34.1 1.2	59.40 .22	77.2 3.0	7.58 -0.4	53.6 0.3	27.24 .06	49.0 0.6
21.1	59.21 +0.2	32.8 1.5	59.26 -0.7	74.2 3.0	7.56 .00	53.4 -0.1	27.20 -0.2	48.3 0.9
31.0	59.25 .06	31.2 1.7	59.26 +0.8	71.2 2.9	7.57 +0.4	53.4 +0.2	27.20 +0.1	47.3 1.1
Apr. 10.0	59.32 .10	29.3 1.9	59.41 .23	68.3 2.8	7.63 .08	53.7 0.4	27.23 .06	46.1 1.3
20.0	59.44 .14	27.3 2.1	59.72 .38	65.7 2.5	7.73 .12	54.3 0.7	27.31 .10	44.6 1.6
29.9	59.60 .18	25.2 2.2	60.17 .51	63.4 2.1	7.88 .16	55.1 0.9	27.42 .14	42.9 1.8
May 9.9	59.80 .22	22.9 2.3	60.74 .62	61.4 1.7	8.06 .20	56.1 1.1	27.59 .18	41.1 1.9
19.9	60.04 .25	20.5 2.4	61.41 .72	60.0 1.2	8.28 .24	57.4 1.4	27.79 .22	39.1 2.0
29.9	60.31 .28	18.2 2.3	62.17 .79	59.1 0.7	8.54 .27	58.9 1.6	28.02 .25	37.0 2.1
June 8.8	60.60 .30	15.9 2.3	62.99 .84	58.7 -0.1	8.82 .29	60.6 1.8	28.29 .28	34.8 2.2
18.8	60.91 .32	13.7 2.1	63.84 .86	58.8 +0.4	9.12 .30	62.5 1.9	28.58 .30	32.6 2.1
28.8	61.23 .32	11.6 2.0	64.71 .86	59.6 1.0	9.42 .31	64.4 1.9	28.88 .30	30.5 2.1
July 8.8	61.55 .32	9.8 1.7	65.57 .84	60.8 1.5	9.73 .31	66.4 2.0	29.19 .31	28.5 1.9
18.7	61.86 .30	8.2 1.4	66.39 .80	62.5 2.0	10.04 .30	68.3 1.9	29.49 .30	26.7 1.7
28.7	62.15 .29	6.9 1.1	67.16 .74	64.7 2.4	10.33 .28	70.2 1.8	29.79 .29	25.0 1.5
Aug. 7.7	62.43 .26	6.0 0.8	67.87 .66	67.3 2.8	10.59 .26	72.0 1.7	30.07 .27	23.7 1.2
17.6	62.67 .22	5.4 0.4	68.49 .57	70.3 3.1	10.84 .23	73.6 1.5	30.33 .25	22.6 0.9
27.6	62.88 .19	5.2 -0.1	69.01 .47	73.5 3.3	11.05 .20	75.1 1.3	30.56 .22	21.8 0.6
Sept. 6.6	63.06 .15	5.3 +0.3	69.43 .37	76.9 3.5	11.23 .16	76.3 1.1	30.76 .18	21.3 -0.3
16.6	63.19 .11	5.7 0.6	69.74 .25	80.5 3.6	11.38 .13	77.3 0.9	30.93 .15	21.2 0.0
26.5	63.29 .08	6.5 0.9	69.93 .14	84.1 3.6	11.49 .09	78.1 0.7	31.06 .12	21.3 +0.3
Oct. 6.5	63.34 +0.4	7.4 1.1	70.01 +0.2	87.8 3.6	11.57 .06	78.7 0.5	31.16 .08	21.7 0.5
16.5	63.36 .00	8.6 1.2	69.97 -1.0	91.4 3.5	11.61 +0.3	79.0 +0.2	31.22 .05	22.4 0.7
26.5	63.35 -0.3	9.9 1.3	69.82 .21	94.8 3.3	11.63 .00	79.2 0.0	31.25 +0.2	23.2 0.9
Nov. 5.4	63.31 .05	11.3 1.4	69.55 .29	97.9 3.0	11.61 -0.3	79.1 -0.1	31.25 -0.1	24.2 1.0
15.4	63.25 .08	12.7 1.3	69.18 .42	100.8 2.7	11.58 .05	78.9 0.3	31.23 .04	25.3 1.1
25.4	63.16 .09	14.0 1.3	68.71 .52	103.2 2.2	11.52 .07	78.6 0.4	31.18 .06	26.4 1.1
Dec. 5.3	63.06 .11	15.2 1.1	68.15 .60	105.2 1.7	11.44 .09	78.1 0.5	31.11 .08	27.4 1.0
15.3	62.94 .12	16.2 0.9	67.51 .66	106.7 1.2	11.35 .10	77.6 0.6	31.02 .10	28.5 1.0
25.3	62.82 .12	17.0 0.7	66.83 .70	107.5 +0.6	11.24 .11	77.0 0.6	30.92 .11	29.4 0.9
35.3	62.69 -1.3	17.7 +0.5	66.11 -7.3	107.8 0.0	11.12 -1.2	76.3 -0.7	30.80 -1.2	30.2 +0.7



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	*A Cassiopeæ.		η Piscium.		α Eridani. (Achernar.)		ο Piscium.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 1 21	<sup>°</sup> <sup>'</sup> 69 35	<sup>h</sup> <sup>m</sup> 1 24	<sup>°</sup> <sup>'</sup> 14 40	<sup>h</sup> <sup>m</sup> 1 32	<sup>°</sup> <sup>'</sup> 57 53	<sup>h</sup> <sup>m</sup> 1 38	<sup>°</sup> <sup>'</sup> 8 29
Jan. 0.3	32.32 -50	32.2 +0.7	28.22 -12	7.2 -0.5	49.16 -33	94.5 +0.6	28.48 -11	44.6 -0.6
10.2	31.79 .53	32.5 +0.1	28.09 .13	6.6 0.7	48.84 .33	94.9 +0.1	28.35 .13	44.0 0.7
20.2	31.25 .54	32.3 -0.5	27.96 .14	5.9 0.7	48.50 .33	94.7 -0.5	28.22 .13	43.3 0.7
30.2	30.71 .53	31.5 1.1	27.82 .14	5.1 0.8	48.18 .32	93.9 1.0	28.09 .14	42.7 0.6
Feb. 9.2	30.20 .50	30.2 1.6	27.68 .13	4.3 0.8	47.86 .30	92.6 1.5	27.95 .13	42.0 0.6
19.1	29.73 .44	28.4 2.0	27.56 .12	3.5 0.8	47.58 .27	90.8 2.0	27.82 .12	41.5 0.5
Mar. 1.1	29.32 .36	26.2 2.4	27.45 .09	2.7 0.7	47.33 .23	88.6 2.4	27.71 .10	41.0 0.4
11.1	29.00 .37	23.7 2.6	27.37 .07	2.0 0.6	47.12 .18	86.0 2.8	27.62 .08	40.6 0.3
21.1	28.79 .16	20.9 2.8	27.32 -0.3	1.5 0.5	46.97 .12	83.0 3.1	27.56 -0.4	40.4 -0.1
31.0	28.69 -0.4	18.1 2.8	27.31 +0.1	1.1 0.3	46.88 -0.6	79.8 3.3	27.53 .00	40.4 +0.1
Apr. 10.0	28.70 +0.8	15.3 2.7	27.34 .05	0.9 -0.1	46.85 +0.1	76.3 3.5	27.55 +0.4	40.5 0.3
20.0	28.84 .20	12.7 2.5	27.41 .10	0.9 +0.2	46.89 .08	72.8 3.6	27.61 .08	41.0 0.5
29.9	29.10 .31	10.3 2.3	27.53 .14	1.3 0.5	47.00 .15	69.2 3.6	27.71 .13	41.6 0.8
May 9.9	29.47 .42	8.2 1.9	27.69 .19	1.9 0.7	47.19 .22	65.6 3.5	27.86 .17	42.5 1.0
19.9	29.93 .51	6.5 1.5	27.90 .22	2.7 1.0	47.43 .26	62.2 3.4	28.05 .21	43.6 1.2
29.9	30.48 .59	5.2 1.0	28.15 .26	3.8 1.2	47.75 .34	58.9 3.1	28.28 .24	45.0 1.5
June 8.8	31.10 .64	4.5 -0.5	28.42 .28	5.2 1.5	48.11 .39	55.9 2.8	28.54 .27	46.6 1.6
18.8	31.77 .68	4.2 0.0	28.71 .30	6.7 1.6	48.53 .43	53.2 2.5	28.82 .29	48.3 1.8
28.8	32.47 .70	4.5 +0.5	29.02 .31	8.4 1.8	48.98 .46	51.0 2.0	29.12 .30	50.1 1.8
July 8.8	33.18 .71	5.2 1.0	29.34 .31	10.3 1.9	49.45 .48	49.2 1.5	29.43 .31	51.9 1.9
18.7	33.88 .69	6.5 1.5	29.65 .31	12.1 1.9	49.93 .48	47.9 1.0	29.74 .30	53.8 1.9
28.7	34.56 .66	8.2 1.9	29.95 .30	14.1 1.9	50.41 .47	47.2 -0.5	30.04 .30	55.6 1.8
Aug. 7.7	35.20 .62	10.3 2.3	30.24 .28	15.9 1.8	50.88 .45	47.0 +0.1	30.33 .28	57.4 1.7
17.6	35.80 .56	12.8 2.7	30.50 .25	17.7 1.8	51.32 .42	47.4 0.7	30.50 .26	59.0 1.5
27.6	36.33 .50	15.6 2.9	30.74 .22	19.4 1.6	51.71 .37	48.4 1.2	30.84 .23	60.5 1.4
Sept. 6.6	36.79 .42	18.7 3.2	30.95 .19	21.0 1.5	52.06 .32	49.9 1.7	31.05 .20	61.7 1.2
16.6	37.17 .34	22.0 3.3	31.12 .16	22.3 1.3	52.34 .26	51.8 2.2	31.24 .17	62.8 0.9
26.5	37.47 .26	25.4 3.4	31.26 .13	23.5 1.1	52.57 .19	54.2 2.5	31.39 .14	63.6 0.7
Oct. 6.5	37.68 .17	28.8 3.5	31.37 .09	24.5 0.9	52.72 .12	56.8 2.8	31.51 .10	64.2 0.5
16.5	37.81 +0.8	32.3 3.4	31.45 .06	25.3 0.7	52.80 +0.5	59.7 2.9	31.60 .08	64.6 0.3
26.5	37.84 -0.1	35.6 3.3	31.50 +0.3	25.9 0.5	52.81 -0.2	62.6 2.9	31.66 .04	64.7 +0.1
Nov. 5.4	37.79 .10	38.8 3.1	31.51 .00	26.2 0.3	52.75 .09	65.5 2.8	31.69 +0.1	64.8 -0.1
15.4	37.64 .19	41.8 2.9	31.50 -0.2	26.5 +0.1	52.63 .15	68.3 2.7	31.69 -0.1	64.6 0.2
25.4	37.40 .27	44.5 2.5	31.46 .05	26.5 0.0	52.46 .20	70.8 2.4	31.67 0.4	64.3 0.4
Dec. 5.3	37.09 .35	46.7 2.0	31.40 .07	26.4 -0.2	52.23 .24	73.0 2.0	31.62 0.6	64.0 0.4
15.3	36.70 .42	48.5 1.6	31.32 .09	26.1 0.3	51.97 .28	74.7 1.5	31.54 .08	63.5 0.5
25.3	36.25 .47	49.8 1.0	31.22 .11	25.7 0.5	51.68 .31	76.0 1.0	31.45 .10	62.9 0.6
35.3	35.75 -51	50.6 +0.5	31.10 -12	25.2 -0.6	51.36 -33	76.7 +0.4	31.34 -12	62.3 -0.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Arietis.		*50 Cassiopeæ.		$\alpha$ Arietis.		$\zeta^1$ Ceti.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 1 47	<sup>°</sup> <sup>'</sup> 20 9	<sup>h</sup> <sup>m</sup> 1 52	<sup>°</sup> <sup>'</sup> 71 46	<sup>h</sup> <sup>m</sup> 1 59	<sup>°</sup> <sup>'</sup> 22 50	<sup>h</sup> <sup>m</sup> 2 6	<sup>°</sup> <sup>'</sup> 8 13
Jan. 0.3	24.30 <sup>s</sup> -12	57.5 <sup>"</sup> -0.4	19.60 <sup>s</sup> -53	77.2 <sup>"</sup> +1.1	47.54 <sup>s</sup> -12	29.0 <sup>"</sup> -0.2	3.37 <sup>s</sup> -10	44.9 <sup>"</sup> -0.6
10.3	24.17 .14	57.0 0.5	19.04 .58	78.0 +0.5	47.41 .14	28.6 0.4	3.25 .12	44.3 0.6
20.2	24.03 .15	56.4 0.7	18.43 .61	78.3 0.0	47.27 .15	28.1 0.6	3.12 .14	43.7 0.6
30.2	23.88 .15	55.7 0.8	17.81 .62	78.0 -0.6	47.11 .16	27.5 0.7	2.98 .14	43.1 0.6
Feb. 9.2	23.73 .15	54.9 0.8	17.20 .59	77.0 1.2	46.95 .16	26.7 0.8	2.83 .14	42.5 0.6
19.2	23.58 .14	54.0 0.9	16.62 .55	75.6 1.6	46.80 .15	25.8 0.9	2.69 .14	42.0 0.5
Mar. 1.1	23.45 .12	53.1 0.9	16.11 .47	73.7 2.1	46.66 .13	24.9 0.9	2.56 .12	41.6 0.4
11.1	23.35 .09	52.3 0.8	15.68 .38	71.5 2.4	46.54 .10	23.9 0.9	2.45 .10	41.3 0.3
21.1	23.27 .06	51.4 0.8	15.35 .27	68.9 2.6	46.45 .07	23.0 0.9	2.36 .07	41.1 -0.1
31.1	23.24 -0.01	50.8 0.6	15.14 .14	66.2 2.8	46.40 -0.03	22.2 0.7	2.31 -0.03	41.1 +0.1
Apr. 10.0	23.25 +0.03	50.3 0.4	15.06 -0.01	63.4 2.8	46.40 +0.02	21.6 0.6	2.30 +0.01	41.3 0.3
20.0	23.30 .08	50.0 -0.2	15.12 +0.13	60.6 2.7	46.44 .07	21.1 0.4	2.34 .06	41.7 0.5
30.0	23.40 .13	49.9 +0.1	15.32 .26	58.0 2.5	46.53 .12	20.8 -0.1	2.41 .10	42.3 0.7
May 9.9	23.55 .17	50.1 0.4	15.64 .38	55.7 2.2	46.67 .16	20.9 +0.2	2.54 .14	43.2 1.0
19.9	23.74 .21	50.6 0.6	16.08 .49	53.7 1.8	46.86 .21	21.1 0.4	2.70 .19	44.3 1.2
29.9	23.98 .25	51.3 0.9	16.63 .59	52.1 1.4	47.08 .24	21.7 0.7	2.91 .22	45.6 1.4
June 8.9	24.24 .28	52.4 1.1	17.26 .67	50.9 0.9	47.34 .28	22.5 1.0	3.15 .26	47.0 1.6
18.8	24.53 .30	53.6 1.4	17.96 .73	50.2 -0.4	47.63 .30	23.6 1.2	3.42 .28	48.7 1.7
28.8	24.84 .32	55.1 1.6	18.71 .77	50.0 +0.1	47.94 .32	24.9 1.4	3.71 .29	50.4 1.8
July 8.8	25.16 .32	56.7 1.7	19.49 .79	50.3 0.6	48.27 .32	26.4 1.6	4.01 .30	52.2 1.8
18.8	25.48 .32	58.5 1.8	20.28 .78	51.1 1.0	48.59 .32	28.1 1.7	4.32 .31	54.0 1.8
28.7	25.79 .31	60.3 1.9	21.06 .77	52.4 1.5	48.91 .32	29.8 1.8	4.62 .30	55.8 1.7
Aug. 7.7	26.10 .29	62.2 1.9	21.82 .73	54.1 1.9	49.22 .30	31.7 1.8	4.91 .29	57.4 1.6
17.7	26.38 .27	64.0 1.8	22.53 .68	56.2 2.3	49.52 .28	33.5 1.8	5.19 .27	59.0 1.5
27.6	26.64 .24	65.8 1.7	23.18 .62	58.7 2.6	49.79 .26	35.3 1.8	5.45 .25	60.4 1.3
Sept. 6.6	26.87 .22	67.5 1.6	23.77 .55	61.5 2.9	50.03 .23	37.0 1.7	5.69 .22	61.6 1.1
16.6	27.07 .19	69.0 1.5	24.29 .47	64.6 3.1	50.25 .20	38.6 1.6	5.89 .19	62.6 0.9
26.6	27.24 .15	70.4 1.3	24.71 .38	67.8 3.3	50.43 .17	40.1 1.4	6.07 .16	63.4 0.6
Oct. 6.5	27.38 .12	71.7 1.2	25.05 .29	71.2 3.4	50.58 .14	41.5 1.3	6.22 .13	63.9 0.4
16.5	27.48 .09	72.8 1.0	25.29 .19	74.6 3.4	50.70 .10	42.7 1.1	6.34 .10	64.2 0.2
26.5	27.55 .06	73.7 0.8	25.43 +0.09	78.0 3.4	50.79 .07	43.7 1.0	6.42 .07	64.4 +0.1
Nov. 5.5	27.59 +0.03	74.4 0.6	25.46 -0.02	81.4 3.2	50.84 .04	44.6 0.8	6.48 .04	64.3 -0.1
15.4	27.60 .00	74.9 0.4	25.39 .13	84.5 3.0	50.87 +0.01	45.3 0.6	6.51 +0.01	64.2 0.2
25.4	27.59 -0.03	75.3 0.3	25.21 .23	87.4 2.8	50.86 -0.02	45.8 0.4	6.51 -0.01	63.8 0.4
Dec. 5.4	27.54 .06	75.4 +0.1	24.93 .33	90.0 2.4	50.83 .05	46.2 0.2	6.48 .04	63.4 0.4
15.3	27.47 .08	75.4 -0.1	24.56 .42	92.2 2.0	50.76 .08	46.3 +0.1	6.43 .07	63.0 0.5
25.3	27.38 .11	75.3 0.2	24.10 .49	94.0 1.5	50.67 .10	46.3 -0.1	6.35 .09	62.4 0.6
35.3	27.26 -0.13	74.9 -0.4	23.57 -0.56	95.2 +0.9	50.56 -0.12	46.1 -0.3	6.25 -0.11	61.9 -0.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	* $\epsilon$ Cassiopeæ.		$\gamma$ Ceti.		$\alpha$ Ceti.		*48 Cephei.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	$^{\text{h}}$ $^{\text{m}}$ 2 18	$^{\circ}$ 48'	$^{\text{h}}$ $^{\text{m}}$ 2 36	$^{\circ}$ 40'	$^{\text{h}}$ $^{\text{m}}$ 2 55	$^{\circ}$ 34'	$^{\text{h}}$ $^{\text{m}}$ 3 3	$^{\circ}$ 77' 14"
Jan. 0.3	19.66 $^{-.37}$	47.9 +1.3	30.88 $^{-.09}$	45.7 $^{-0.7}$	26.11 $^{-.08}$	17.5 $^{-0.7}$	51.45 $^{-.61}$	62.4 +2.1
10.3	19.26 $^{.42}$	48.9 0.8	30.78 $^{.12}$	45.0 0.7	26.01 $^{.11}$	16.8 0.7	50.77 $^{.73}$	64.2 1.6
20.3	18.81 $^{.46}$	49.4 +0.2	30.65 $^{.13}$	44.3 0.6	25.89 $^{.13}$	16.2 0.6	49.99 $^{.83}$	65.5 1.0
30.3	18.34 $^{.48}$	49.3 $^{-0.3}$	30.51 $^{.15}$	43.7 0.5	25.75 $^{.15}$	15.6 0.5	49.12 $^{.89}$	66.3 +0.5
Feb. 9.2	17.86 $^{.47}$	48.7 0.9	30.36 $^{.15}$	43.3 0.4	25.60 $^{.16}$	15.1 0.4	48.20 $^{.91}$	66.4 $^{-0.1}$
19.2	17.39 $^{.45}$	47.6 1.4	30.21 $^{.15}$	42.9 0.3	25.44 $^{.16}$	14.8 0.3	47.29 $^{.90}$	66.0 0.7
Mar. 1.2	16.96 $^{.40}$	46.0 1.8	30.06 $^{.14}$	42.7 $^{-0.1}$	25.28 $^{.15}$	14.5 $^{-0.2}$	46.40 $^{.85}$	65.0 1.3
11.2	16.59 $^{.34}$	44.0 2.1	29.93 $^{.19}$	42.6 0.0	25.14 $^{.13}$	14.4 0.0	45.59 $^{.76}$	63.5 1.8
21.1	16.29 $^{.25}$	41.8 2.4	29.82 $^{.09}$	42.7 +0.2	25.02 $^{.11}$	14.5 +0.1	44.88 $^{.64}$	61.5 2.2
31.1	16.08 $^{.16}$	39.3 2.5	29.74 $^{.06}$	43.0 0.4	24.93 $^{.08}$	14.7 0.3	44.31 $^{.49}$	59.2 2.5
Apr. 10.1	15.97 $^{-.06}$	36.7 2.6	29.70 $^{-.02}$	43.5 0.6	24.87 $^{-.04}$	15.1 0.5	43.91 $^{.32}$	56.6 2.7
20.0	15.97 +0.5	34.1 2.5	29.70 +0.2	44.2 0.8	24.85 +0.1	15.8 0.7	43.68 $^{-.13}$	53.8 2.8
30.0	16.07 $^{.16}$	31.7 2.4	29.75 $^{.07}$	45.1 1.0	24.88 $^{.05}$	16.6 0.9	43.64 +0.6	51.0 2.8
May 10.0	16.29 $^{.27}$	29.4 2.1	29.84 $^{.11}$	46.2 1.2	24.96 $^{.10}$	17.6 1.1	43.79 $^{.24}$	48.3 2.7
20.0	16.61 $^{.36}$	27.4 1.8	29.08 $^{.16}$	47.5 1.4	25.07 $^{.14}$	18.9 1.3	44.13 $^{.42}$	45.7 2.5
29.9	17.01 $^{.45}$	25.7 1.5	30.15 $^{.20}$	49.0 1.6	25.24 $^{.18}$	20.3 1.5	44.64 $^{.59}$	43.4 2.2
June 8.9	17.50 $^{.52}$	24.5 1.0	30.37 $^{.23}$	50.7 1.7	25.44 $^{.22}$	21.9 1.6	45.31 $^{.73}$	41.3 1.8
18.9	18.05 $^{.57}$	23.7 0.8	30.62 $^{.26}$	52.4 1.8	25.67 $^{.25}$	23.5 1.7	46.11 $^{.86}$	39.7 1.4
28.9	18.65 $^{.62}$	23.3 $^{-0.1}$	30.89 $^{.28}$	54.3 1.8	25.93 $^{.27}$	25.3 1.8	47.02 $^{.96}$	38.4 1.0
July 8.8	19.28 $^{.64}$	23.4 +0.3	31.17 $^{.29}$	56.1 1.8	26.21 $^{.29}$	27.1 1.8	48.03 $^{1.04}$	37.7 0.6
18.8	19.93 $^{.65}$	24.0 0.8	31.47 $^{.30}$	57.9 1.8	26.51 $^{.30}$	28.8 1.7	49.10 $^{1.09}$	37.3 $^{-0.1}$
28.8	20.58 $^{.64}$	25.0 1.2	31.77 $^{.30}$	59.6 1.7	26.81 $^{.30}$	30.5 1.6	50.20 $^{1.11}$	37.5 +0.4
Aug. 7.7	21.21 $^{.62}$	26.4 1.6	32.07 $^{.29}$	61.2 1.5	27.10 $^{.29}$	32.1 1.5	51.32 $^{1.12}$	38.1 0.9
17.7	21.83 $^{.59}$	28.2 2.0	32.36 $^{.28}$	62.6 1.3	27.39 $^{.28}$	33.5 1.3	52.44 $^{1.10}$	39.2 1.3
27.7	22.40 $^{.55}$	30.4 2.3	32.63 $^{.28}$	63.8 1.1	27.67 $^{.27}$	34.7 1.1	53.52 $^{1.06}$	40.8 1.7
Sept. 6.7	22.93 $^{.50}$	32.9 2.6	32.88 $^{.24}$	64.8 0.8	27.93 $^{.25}$	35.6 0.8	54.55 $^{1.00}$	42.7 2.1
16.6	23.41 $^{.44}$	35.7 2.8	33.10 $^{.21}$	65.5 0.6	28.17 $^{.23}$	36.4 0.6	55.51 $^{.92}$	45.0 2.5
26.6	23.82 $^{.38}$	38.6 3.0	33.31 $^{.19}$	65.9 0.3	28.39 $^{.20}$	36.8 0.3	56.38 $^{.82}$	47.6 2.8
Oct. 6.6	24.16 $^{.31}$	41.7 3.1	33.48 $^{.16}$	66.1 +0.1	28.58 $^{.18}$	37.0 +0.1	57.15 $^{.71}$	50.5 3.0
16.6	24.43 $^{.23}$	44.9 3.2	33.62 $^{.13}$	66.1 $^{-0.1}$	28.74 $^{.16}$	37.0 $^{-0.1}$	57.80 $^{.59}$	53.6 3.2
26.5	24.63 $^{.15}$	48.1 3.2	33.74 $^{.10}$	65.8 0.3	28.87 $^{.12}$	36.8 0.3	58.32 $^{.44}$	56.9 3.3
Nov. 5.5	24.74 +0.7	51.2 3.1	33.82 $^{.07}$	65.4 0.5	28.98 $^{.09}$	36.4 0.5	58.69 $^{.29}$	60.3 3.4
15.5	24.77 $^{-.01}$	54.2 2.9	33.88 $^{.04}$	64.8 0.6	29.06 $^{.06}$	35.8 0.6	58.90 +1.3	63.7 3.4
25.4	24.71 $^{.10}$	57.1 2.7	33.90 +0.1	64.2 0.7	29.10 +0.3	35.2 0.7	58.95 $^{-.03}$	67.0 3.3
Dec. 5.4	24.57 $^{.18}$	59.6 2.4	33.90 $^{-.02}$	63.4 0.8	29.11 $^{.00}$	34.5 0.7	58.84 $^{.20}$	70.2 3.0
15.4	24.35 $^{.26}$	61.9 2.0	33.87 $^{.05}$	62.7 0.8	29.10 $^{-.03}$	33.7 0.7	58.55 $^{.36}$	73.1 2.7
25.4	24.05 $^{.33}$	63.7 1.6	33.81 $^{.07}$	61.9 0.7	29.05 $^{.06}$	33.0 0.7	58.11 $^{.52}$	75.6 2.4
35.3	23.69 $^{-.39}$	65.1 +1.1	33.72 $^{-.10}$	61.2 $^{-0.7}$	28.97 $^{-.09}$	32.3 $^{-0.7}$	57.52 $^{-.65}$	77.8 +1.9

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\zeta$ Arietis.		$\alpha$ Persei.		$\delta$ Persei.		$\eta$ Tauri.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 3 <sup>m</sup> 7	<sup>°</sup> 20 <sup>'</sup> 33	<sup>h</sup> 3 <sup>m</sup> 14	<sup>°</sup> 49 <sup>'</sup> 23	<sup>h</sup> 3 <sup>m</sup> 33	<sup>°</sup> 47 <sup>'</sup> 21	<sup>h</sup> 3 <sup>m</sup> 39	<sup>°</sup> 23 <sup>'</sup> 41
Jan. 0.4	22.77 -.08	21.7 -0.1	59.67 -.14	34.5 +1.2	37.11 -.11	58.3 +1.2	42.44 -.06	47.6 +0.1
10.3	22.67 .11	21.5 0.2	59.51 .18	35.5 0.8	36.98 .16	59.3 0.9	42.36 .10	47.7 0.0
20.3	22.55 .14	21.2 0.3	59.31 .22	36.2 0.4	36.80 .20	60.0 0.6	42.25 .13	47.6 -0.1
30.3	22.40 .16	20.9 0.4	59.07 .25	36.4 +0.1	36.58 .23	60.4 +0.2	42.10 .16	47.5 0.2
Feb. 9.3	22.23 .17	20.4 0.5	58.81 .27	36.3 -0.3	36.34 .25	60.5 -0.1	41.94 .17	47.2 0.3
19.2	22.06 .17	19.9 0.6	58.54 .27	35.8 0.7	36.07 .26	60.1 0.5	41.76 .18	46.8 0.4
Mar. 1.2	21.89 .16	19.3 0.6	58.27 .26	35.0 1.0	35.81 .26	59.5 0.8	41.57 .18	46.4 0.5
11.2	21.73 .15	18.7 0.6	58.01 .24	33.8 1.3	35.56 .24	58.5 1.1	41.39 .17	45.9 0.6
21.2	21.59 .12	18.2 0.6	57.80 .20	32.4 1.5	35.34 .20	57.3 1.3	41.23 .15	45.3 0.6
31.1	21.49 .09	17.6 0.5	57.62 .15	30.7 1.7	35.15 .16	55.9 1.5	41.10 .12	44.7 0.6
Apr. 10.1	21.42 -.05	17.2 0.4	57.50 .09	29.0 1.7	35.02 .11	54.3 1.6	41.00 .08	44.2 0.5
20.1	21.39 .00	16.8 0.3	57.44 -.03	27.3 1.8	34.94 -.05	52.7 1.6	40.94 -.03	43.7 0.4
30.0	21.41 +0.05	16.7 -0.1	57.45 +0.04	25.5 1.7	34.92 +0.02	51.1 1.6	40.93 +0.01	43.3 0.3
May 10.0	21.48 .10	16.6 +0.1	57.52 .11	23.9 1.5	34.97 .09	49.6 1.5	40.97 .07	43.1 -0.1
20.0	21.60 .14	16.9 0.3	57.67 .18	22.5 1.3	35.09 .15	48.2 1.3	41.06 .11	43.1 0.0
30.0	21.77 .19	17.3 0.5	57.88 .24	21.2 1.1	35.27 .21	47.0 1.1	41.20 .16	43.2 +0.2
June 8.9	21.97 .23	17.9 0.7	58.14 .29	20.3 0.8	35.51 .26	46.1 0.8	41.39 .20	43.5 0.4
18.9	22.22 .26	18.8 0.9	58.46 .34	19.7 0.5	35.80 .31	45.4 0.5	41.61 .24	44.1 0.6
28.9	22.49 .28	19.8 1.1	58.82 .38	19.4 -0.1	36.13 .35	45.0 -0.2	41.86 .27	44.7 0.8
July 8.9	22.79 .30	21.0 1.2	59.21 .40	19.4 +0.2	36.50 .38	44.9 +0.1	42.15 .29	45.6 0.9
18.8	23.10 .31	22.3 1.3	59.63 .42	19.8 0.5	36.89 .40	45.2 0.4	42.45 .31	46.6 1.1
28.8	23.41 .32	23.7 1.4	60.05 .43	20.4 0.8	37.30 .41	45.7 0.7	42.76 .32	47.7 1.1
Aug. 7.8	23.73 .31	25.1 1.4	60.48 .43	21.4 1.1	37.71 .41	46.5 0.9	43.09 .32	48.9 1.2
17.7	24.04 .30	26.5 1.4	60.91 .42	22.7 1.4	38.13 .41	47.5 1.2	43.41 .32	50.1 1.2
27.7	24.34 .29	27.9 1.4	61.32 .40	24.2 1.6	38.53 .40	48.8 1.4	43.72 .31	51.4 1.2
Sept. 6.7	24.62 .27	29.3 1.3	61.71 .38	25.9 1.8	38.93 .38	50.3 1.6	44.02 .29	52.5 1.2
16.7	24.88 .25	30.5 1.2	62.08 .35	27.7 1.9	39.30 .36	51.9 1.7	44.31 .28	53.7 1.1
26.6	25.12 .23	31.6 1.1	62.42 .32	29.7 2.1	39.64 .33	53.7 1.8	44.57 .26	54.7 1.0
Oct. 6.6	25.34 .20	32.6 0.9	62.73 .29	31.8 2.2	39.96 .30	55.6 1.9	44.82 .24	55.7 0.9
16.6	25.52 .17	33.5 0.8	62.99 .25	34.0 2.2	40.24 .27	57.6 2.0	45.04 .21	56.6 0.8
26.6	25.68 .14	34.2 0.7	63.22 .20	36.2 2.2	40.49 .23	59.6 2.0	45.24 .18	57.4 0.7
Nov. 5.5	25.81 .11	34.8 0.5	63.40 .16	38.5 2.2	40.69 .18	61.6 2.0	45.41 .15	58.1 0.6
15.5	25.91 .08	35.3 0.4	63.54 .11	40.6 2.1	40.86 .14	63.6 2.0	45.54 .12	58.6 0.6
25.5	25.97 .05	35.7 0.3	63.62 .06	42.7 2.0	40.97 .09	65.5 1.9	45.64 .08	59.2 0.5
Dec. 5.4	26.00 +0.01	35.9 0.2	63.66 +0.01	44.6 1.8	41.03 +0.04	67.3 1.8	45.71 .05	59.6 0.4
15.4	26.00 -.02	36.1 +0.1	63.64 -.05	46.3 1.6	41.04 -.02	69.0 1.6	45.73 +0.01	59.9 0.3
25.4	25.96 .06	36.1 0.0	63.56 .10	47.8 1.4	40.99 .07	70.5 1.4	45.72 -.03	60.1 0.2
35.4	25.88 -.09	36.0 -0.1	63.43 -.15	49.1 +1.1	40.90 -.12	71.7 +1.1	45.67 -.07	60.3 +0.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\zeta$ Persei.		$\gamma^1$ Eridani.		$\gamma$ Tauri.		$\epsilon$ Tauri.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 3 <sup>m</sup> 45	<sup>°</sup> 31 <sup>'</sup> 29	<sup>h</sup> 3 <sup>m</sup> 51	<sup>°</sup> 13 <sup>'</sup> 52	<sup>h</sup> 4 <sup>m</sup> 12	<sup>°</sup> 15 <sup>'</sup> 18	<sup>h</sup> 4 <sup>m</sup> 20	<sup>°</sup> 18 <sup>'</sup> 53
Jan. 0.4	54.62 <sup>s</sup> -06	28.7 <sup>"</sup> +0.5	55.45 <sup>s</sup> -06	72.8 <sup>"</sup> +1.5	20.87 <sup>s</sup> -03	24.9 <sup>"</sup> -0.3	58.65 <sup>s</sup> -02	7.8 <sup>"</sup> -0.1
10.3	54.54 .10	29.1 0.3	55.37 .10	74.2 1.3	20.82 .07	24.6 0.3	58.60 .06	7.7 0.1
20.3	54.42 .14	29.4 +0.2	55.26 .13	75.4 1.0	20.73 .10	24.4 0.3	58.52 .10	7.6 0.1
30.3	54.26 .17	29.5 0.0	55.11 .15	76.3 0.8	20.61 .14	24.1 0.3	58.40 .13	7.4 0.2
Feb. 9.3	54.08 .19	29.4 -0.2	54.95 .17	76.9 0.5	20.46 .16	23.8 0.3	58.25 .16	7.3 0.2
19.2	53.89 .20	29.0 0.4	54.77 .18	77.2 +0.2	20.29 .17	23.5 0.3	58.08 .18	7.0 0.2
Mar. 1.2	53.68 .20	28.6 0.5	54.59 .18	77.2 -0.1	20.12 .18	23.3 0.3	57.90 .18	6.8 0.3
11.2	53.49 .19	28.0 0.7	54.41 .17	77.0 0.4	19.94 .17	23.0 0.3	57.71 .18	6.5 0.3
21.2	53.31 .16	27.2 0.8	54.25 .15	76.4 0.7	19.77 .16	22.8 0.2	57.54 .16	6.2 0.3
31.1	53.16 .13	26.4 0.9	54.10 .13	75.5 1.0	19.62 .14	22.6 0.1	57.39 .14	6.0 0.2
Apr. 10.1	53.04 .09	25.5 0.9	53.98 .10	74.4 1.3	19.50 .10	22.5 -0.1	57.26 .11	5.7 0.2
20.1	52.98 -04	24.7 0.8	53.91 .06	73.0 1.5	19.42 .06	22.5 +0.1	57.17 .07	5.6 -0.1
30.0	52.96 +0.1	23.9 0.7	53.88 -0.1	71.4 1.8	19.39 -0.2	22.6 0.2	57.12 -0.2	5.5 0.0
May 10.0	53.00 .06	23.2 0.6	53.89 +0.3	69.5 2.0	19.39 +0.3	22.8 0.3	57.12 +0.2	5.5 +0.1
20.0	53.08 .11	22.7 0.4	53.94 .06	67.4 2.1	19.45 .06	23.2 0.5	57.17 .07	5.7 0.2
30.0	53.22 .17	22.3 -0.2	54.04 .12	65.2 2.3	19.55 .12	23.8 0.6	57.27 .12	6.0 0.4
June 8.9	53.41 .21	22.2 0.0	54.19 .16	62.9 2.3	19.69 .16	24.5 0.8	57.41 .16	6.5 0.5
18.9	53.65 .25	22.3 +0.2	54.37 .20	60.6 2.3	19.88 .20	25.3 0.9	57.59 .20	7.1 0.7
28.9	53.91 .28	22.6 0.4	54.59 .23	58.2 2.3	20.10 .24	26.3 1.0	57.81 .24	7.8 0.8
July 8.9	54.21 .31	23.1 0.6	54.83 .26	56.0 2.2	20.35 .26	27.3 1.1	58.06 .26	8.7 0.9
18.8	54.53 .33	23.7 0.8	55.10 .28	53.8 2.0	20.62 .28	28.5 1.1	58.33 .28	9.6 1.0
28.8	54.86 .34	24.6 0.9	55.38 .29	51.9 1.8	20.91 .29	29.6 1.2	58.62 .30	10.6 1.0
Aug. 7.8	55.20 .34	25.6 1.0	55.67 .29	50.2 1.5	21.21 .30	30.8 1.1	58.92 .30	11.6 1.0
17.7	55.54 .34	26.7 1.1	55.97 .29	48.9 1.2	21.51 .30	31.9 1.1	59.23 .31	12.6 1.0
27.7	55.88 .33	27.8 1.2	56.26 .29	47.9 0.8	21.81 .30	32.9 1.0	59.53 .31	13.6 0.9
Sept. 6.7	56.20 .32	29.1 1.2	56.54 .28	47.3 -0.4	22.10 .29	33.9 0.9	59.84 .30	14.5 0.8
16.7	56.51 .30	30.3 1.3	56.81 .26	47.0 .00	22.39 .28	34.6 0.7	60.13 .29	15.3 0.7
26.6	56.80 .28	31.6 1.3	57.06 .24	47.2 +0.4	22.67 .28	35.3 0.6	60.41 .28	16.0 0.6
Oct. 6.6	57.07 .26	32.8 1.2	57.29 .22	47.8 0.7	22.92 .25	35.8 0.4	60.68 .26	16.5 0.5
16.6	57.31 .23	34.0 1.2	57.50 .20	48.7 1.1	23.16 .22	36.1 0.3	60.93 .24	17.0 0.4
26.6	57.53 .20	35.2 1.1	57.68 .17	49.9 1.4	23.37 .20	36.3 +0.1	61.16 .22	17.3 0.3
Nov. 5.5	57.72 .17	36.3 1.1	57.84 .14	51.4 1.6	23.56 .17	36.4 0.0	61.36 .19	17.6 0.2
15.5	57.87 .13	37.3 1.0	57.96 .11	53.1 1.7	23.72 .15	36.3 -0.1	61.53 .16	17.7 0.1
25.5	57.98 .10	38.3 0.9	58.05 .07	54.8 1.8	23.85 .11	36.2 0.1	61.67 .12	17.8 +0.1
Dec. 5.4	58.06 .06	39.2 0.8	58.10 +0.3	56.6 1.8	23.95 .08	36.1 0.2	61.78 .09	17.8 0.0
15.4	58.09 +0.1	40.0 0.7	58.12 .00	58.4 1.7	24.00 +0.4	35.9 0.2	61.85 .06	17.8 0.0
25.4	58.08 -0.3	40.7 0.6	58.10 -0.4	60.0 1.6	24.02 .00	35.6 0.2	61.87 +0.1	17.8 0.0
35.4	58.02 -0.7	41.2 +0.5	58.04 -0.7	61.5 +1.4	24.00 -0.4	35.4 -0.3	61.86 -0.4	17.8 -0.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	<i><math>\alpha</math> Tauri.</i> ( <i>Aldebaran</i> .)		<i>*<math>\alpha</math> Camelopardalis.</i>		<i><math>\epsilon</math> Aurigæ.</i>		11 Orionis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sub>4</sub> <sup>m</sup> <sub>28</sub>	<sup>°</sup> <sub>16</sub> <sup>'</sup> <sub>14</sub>	<sup>h</sup> <sub>4</sub> <sup>m</sup> <sub>41</sub>	<sup>°</sup> <sub>66</sub> <sup>'</sup> <sub>6</sub>	<sup>h</sup> <sub>4</sub> <sup>m</sup> <sub>48</sub>	<sup>°</sup> <sub>32</sub> <sup>'</sup> <sub>57</sub>	<sup>h</sup> <sub>4</sub> <sup>m</sup> <sub>57</sub>	<sup>°</sup> <sub>15</sub> <sup>'</sup> <sub>12</sub>
Jan. 0.4	<sup>s</sup> <sub>24.85</sub> - <sup>"</sup> <sub>.02</sub>	<sup>"</sup> <sub>30.4</sub> - <sup>"</sup> <sub>.02</sub>	<sup>s</sup> <sub>4.54</sub> - <sup>"</sup> <sub>.10</sub>	<sup>"</sup> <sub>56.9</sub> + <sup>"</sup> <sub>2.4</sub>	<sup>s</sup> <sub>28.60</sub> .00	<sup>"</sup> <sub>16.0</sub> + <sup>"</sup> <sub>0.7</sub>	<sup>s</sup> <sub>5.71</sub> .00	<sup>"</sup> <sub>61.4</sub> - <sup>"</sup> <sub>0.3</sub>
10.4	<sup>s</sup> <sub>24.82</sub> .06	<sup>"</sup> <sub>30.1</sub> 0.2	<sup>s</sup> <sub>4.39</sub> .20	<sup>"</sup> <sub>59.1</sub> 2.1	<sup>s</sup> <sub>28.57</sub> - <sup>"</sup> <sub>.05</sub>	<sup>"</sup> <sub>16.7</sub> 0.6	<sup>s</sup> <sub>5.69</sub> - <sup>"</sup> <sub>.04</sub>	<sup>"</sup> <sub>61.2</sub> 0.2
20.4	<sup>s</sup> <sub>24.74</sub> .10	<sup>"</sup> <sub>29.9</sub> 0.2	<sup>s</sup> <sub>4.15</sub> .28	<sup>"</sup> <sub>61.1</sub> 1.8	<sup>s</sup> <sub>28.50</sub> .10	<sup>"</sup> <sub>17.3</sub> 0.5	<sup>s</sup> <sub>5.63</sub> .08	<sup>"</sup> <sub>60.9</sub> 0.2
30.3	<sup>s</sup> <sub>24.62</sub> .13	<sup>"</sup> <sub>29.7</sub> 0.2	<sup>s</sup> <sub>3.83</sub> .36	<sup>"</sup> <sub>62.7</sub> 1.4	<sup>s</sup> <sub>28.38</sub> .14	<sup>"</sup> <sub>17.8</sub> 0.4	<sup>s</sup> <sub>5.54</sub> .11	<sup>"</sup> <sub>60.7</sub> 0.2
Feb. 9.3	<sup>s</sup> <sub>24.48</sub> .16	<sup>"</sup> <sub>29.5</sub> 0.2	<sup>s</sup> <sub>3.43</sub> .42	<sup>"</sup> <sub>63.8</sub> 0.9	<sup>s</sup> <sub>28.22</sub> .17	<sup>"</sup> <sub>18.1</sub> 0.2	<sup>s</sup> <sub>5.41</sub> .14	<sup>"</sup> <sub>60.5</sub> 0.2
19.3	<sup>s</sup> <sub>24.31</sub> .17	<sup>"</sup> <sub>29.3</sub> 0.2	<sup>s</sup> <sub>2.99</sub> .46	<sup>"</sup> <sub>64.5</sub> + <sup>"</sup> <sub>0.5</sub>	<sup>s</sup> <sub>28.03</sub> .20	<sup>"</sup> <sub>18.2</sub> + <sup>"</sup> <sub>0.1</sub>	<sup>s</sup> <sub>5.25</sub> .17	<sup>"</sup> <sub>60.4</sub> 0.2
Mar. 1.2	<sup>s</sup> <sub>24.13</sub> .18	<sup>"</sup> <sub>29.0</sub> 0.2	<sup>s</sup> <sub>2.51</sub> .48	<sup>"</sup> <sub>64.8</sub> 0.0	<sup>s</sup> <sub>27.82</sub> .21	<sup>"</sup> <sub>18.2</sub> - <sup>"</sup> <sub>0.1</sub>	<sup>s</sup> <sub>5.07</sub> .18	<sup>"</sup> <sub>60.2</sub> 0.1
11.2	<sup>s</sup> <sub>23.95</sub> .18	<sup>"</sup> <sub>28.8</sub> 0.2	<sup>s</sup> <sub>2.03</sub> .47	<sup>"</sup> <sub>64.5</sub> - <sup>"</sup> <sub>0.5</sub>	<sup>s</sup> <sub>27.61</sub> .21	<sup>"</sup> <sub>17.9</sub> 0.3	<sup>s</sup> <sub>4.89</sub> .18	<sup>"</sup> <sub>60.1</sub> 0.1
21.2	<sup>s</sup> <sub>23.77</sub> .17	<sup>"</sup> <sub>28.6</sub> 0.2	<sup>s</sup> <sub>1.56</sub> .45	<sup>"</sup> <sub>63.7</sub> 1.0	<sup>s</sup> <sub>27.40</sub> .20	<sup>"</sup> <sub>17.6</sub> 0.4	<sup>s</sup> <sub>4.70</sub> .18	<sup>"</sup> <sub>60.0</sub> 0.1
31.2	<sup>s</sup> <sub>23.62</sub> .14	<sup>"</sup> <sub>28.4</sub> 0.2	<sup>s</sup> <sub>1.14</sub> .39	<sup>"</sup> <sub>62.5</sub> 1.4	<sup>s</sup> <sub>27.21</sub> .18	<sup>"</sup> <sub>17.1</sub> 0.6	<sup>s</sup> <sub>4.53</sub> .16	<sup>"</sup> <sub>59.9</sub> - <sup>"</sup> <sub>0.1</sub>
Apr. 10.1	<sup>s</sup> <sub>23.49</sub> .11	<sup>"</sup> <sub>28.3</sub> - <sup>"</sup> <sub>0.1</sub>	<sup>s</sup> <sub>0.77</sub> .33	<sup>"</sup> <sub>61.0</sub> 1.7	<sup>s</sup> <sub>27.05</sub> .14	<sup>"</sup> <sub>16.4</sub> 0.7	<sup>s</sup> <sub>4.39</sub> .13	<sup>"</sup> <sub>59.9</sub> 0.0
20.1	<sup>s</sup> <sub>23.39</sub> .07	<sup>"</sup> <sub>28.2</sub> 0.0	<sup>s</sup> <sub>0.49</sub> .24	<sup>"</sup> <sub>59.1</sub> 2.0	<sup>s</sup> <sub>26.92</sub> .10	<sup>"</sup> <sub>15.7</sub> 0.7	<sup>s</sup> <sub>4.28</sub> .10	<sup>"</sup> <sub>59.9</sub> + <sup>"</sup> <sub>0.1</sub>
30.1	<sup>s</sup> <sub>23.34</sub> - <sup>"</sup> <sub>.03</sub>	<sup>"</sup> <sub>28.3</sub> + <sup>"</sup> <sub>0.1</sub>	<sup>s</sup> <sub>0.29</sub> .15	<sup>"</sup> <sub>57.0</sub> 2.2	<sup>s</sup> <sub>26.85</sub> - <sup>"</sup> <sub>.05</sub>	<sup>"</sup> <sub>15.0</sub> 0.7	<sup>s</sup> <sub>4.20</sub> .04	<sup>"</sup> <sub>60.0</sub> 0.2
May 10.1	<sup>s</sup> <sub>23.33</sub> + <sup>"</sup> <sub>.02</sub>	<sup>"</sup> <sub>28.5</sub> 0.2	<sup>s</sup> <sub>0.19</sub> - <sup>"</sup> <sub>.04</sub>	<sup>"</sup> <sub>54.8</sub> 2.3	<sup>s</sup> <sub>26.82</sub> .00	<sup>"</sup> <sub>14.3</sub> 0.7	<sup>s</sup> <sub>4.17</sub> - <sup>"</sup> <sub>.01</sub>	<sup>"</sup> <sub>60.2</sub> 0.3
20.0	<sup>s</sup> <sub>23.37</sub> .06	<sup>"</sup> <sub>28.8</sub> 0.4	<sup>s</sup> <sub>0.20</sub> + <sup>"</sup> <sub>.06</sub>	<sup>"</sup> <sub>52.5</sub> 2.3	<sup>s</sup> <sub>26.84</sub> + <sup>"</sup> <sub>.05</sub>	<sup>"</sup> <sub>13.7</sub> 0.6	<sup>s</sup> <sub>4.18</sub> + <sup>"</sup> <sub>.04</sub>	<sup>"</sup> <sub>60.6</sub> 0.4
30.0	<sup>s</sup> <sub>23.46</sub> .11	<sup>"</sup> <sub>29.2</sub> 0.5	<sup>s</sup> <sub>0.31</sub> .16	<sup>"</sup> <sub>50.3</sub> 2.2	<sup>s</sup> <sub>26.92</sub> .11	<sup>"</sup> <sub>13.1</sub> 0.5	<sup>s</sup> <sub>4.24</sub> .08	<sup>"</sup> <sub>61.0</sub> 0.5
June 9.0	<sup>s</sup> <sub>23.59</sub> .15	<sup>"</sup> <sub>29.8</sub> 0.7	<sup>s</sup> <sub>0.52</sub> .26	<sup>"</sup> <sub>48.1</sub> 2.1	<sup>s</sup> <sub>27.04</sub> .15	<sup>"</sup> <sub>12.6</sub> 0.4	<sup>s</sup> <sub>4.34</sub> .13	<sup>"</sup> <sub>61.6</sub> 0.6
18.9	<sup>s</sup> <sub>23.76</sub> .19	<sup>"</sup> <sub>30.5</sub> 0.8	<sup>s</sup> <sub>0.83</sub> .35	<sup>"</sup> <sub>46.1</sub> 1.9	<sup>s</sup> <sub>27.22</sub> .20	<sup>"</sup> <sub>12.3</sub> 0.2	<sup>s</sup> <sub>4.49</sub> .16	<sup>"</sup> <sub>62.3</sub> 0.7
28.9	<sup>s</sup> <sub>23.97</sub> .22	<sup>"</sup> <sub>31.4</sub> 0.9	<sup>s</sup> <sub>1.22</sub> .43	<sup>"</sup> <sub>44.4</sub> 1.6	<sup>s</sup> <sub>27.43</sub> .24	<sup>"</sup> <sub>12.2</sub> - <sup>"</sup> <sub>0.1</sub>	<sup>s</sup> <sub>4.67</sub> .20	<sup>"</sup> <sub>63.1</sub> 0.8
July 8.9	<sup>s</sup> <sub>24.21</sub> .25	<sup>"</sup> <sub>32.3</sub> 1.0	<sup>s</sup> <sub>1.69</sub> .50	<sup>"</sup> <sub>42.9</sub> 1.3	<sup>s</sup> <sub>27.69</sub> .27	<sup>"</sup> <sub>12.2</sub> + <sup>"</sup> <sub>0.1</sub>	<sup>s</sup> <sub>4.89</sub> .23	<sup>"</sup> <sub>64.0</sub> 0.9
18.9	<sup>s</sup> <sub>24.48</sub> .27	<sup>"</sup> <sub>33.3</sub> 1.0	<sup>s</sup> <sub>2.22</sub> .56	<sup>"</sup> <sub>41.7</sub> 1.0	<sup>s</sup> <sub>27.97</sub> .30	<sup>"</sup> <sub>12.3</sub> 0.2	<sup>s</sup> <sub>5.13</sub> .25	<sup>"</sup> <sub>64.9</sub> 0.9
28.8	<sup>s</sup> <sub>24.76</sub> .29	<sup>"</sup> <sub>34.4</sub> 1.1	<sup>s</sup> <sub>2.80</sub> .80	<sup>"</sup> <sub>40.8</sub> 0.7	<sup>s</sup> <sub>28.28</sub> .32	<sup>"</sup> <sub>12.6</sub> 0.3	<sup>s</sup> <sub>5.40</sub> .27	<sup>"</sup> <sub>65.8</sub> 0.9
Aug. 7.8	<sup>s</sup> <sub>25.05</sub> .30	<sup>"</sup> <sub>35.4</sub> 1.0	<sup>s</sup> <sub>3.42</sub> .63	<sup>"</sup> <sub>40.3</sub> - <sup>"</sup> <sub>0.3</sub>	<sup>s</sup> <sub>28.61</sub> .33	<sup>"</sup> <sub>13.0</sub> 0.5	<sup>s</sup> <sub>5.68</sub> .29	<sup>"</sup> <sub>66.7</sub> 0.9
17.8	<sup>s</sup> <sub>25.35</sub> .30	<sup>"</sup> <sub>36.4</sub> 1.0	<sup>s</sup> <sub>4.07</sub> .65	<sup>"</sup> <sub>40.2</sub> 0.0	<sup>s</sup> <sub>28.94</sub> .34	<sup>"</sup> <sub>13.5</sub> 0.6	<sup>s</sup> <sub>5.97</sub> .30	<sup>"</sup> <sub>67.6</sub> 0.8
27.8	<sup>s</sup> <sub>25.66</sub> .30	<sup>"</sup> <sub>37.4</sub> 0.9	<sup>s</sup> <sub>4.73</sub> .66	<sup>"</sup> <sub>40.4</sub> + <sup>"</sup> <sub>0.4</sub>	<sup>s</sup> <sub>29.28</sub> .34	<sup>"</sup> <sub>14.1</sub> 0.6	<sup>s</sup> <sub>6.27</sub> .30	<sup>"</sup> <sub>68.4</sub> 0.7
Sept. 6.7	<sup>s</sup> <sub>25.96</sub> .30	<sup>"</sup> <sub>38.2</sub> 0.8	<sup>s</sup> <sub>5.39</sub> .66	<sup>"</sup> <sub>40.9</sub> 0.7	<sup>s</sup> <sub>29.63</sub> .34	<sup>"</sup> <sub>14.8</sub> 0.7	<sup>s</sup> <sub>6.56</sub> .30	<sup>"</sup> <sub>69.1</sub> 0.6
16.7	<sup>s</sup> <sub>26.25</sub> .29	<sup>"</sup> <sub>38.9</sub> 0.7	<sup>s</sup> <sub>6.05</sub> .65	<sup>"</sup> <sub>41.9</sub> 1.1	<sup>s</sup> <sub>29.96</sub> .33	<sup>"</sup> <sub>15.5</sub> 0.7	<sup>s</sup> <sub>6.86</sub> .29	<sup>"</sup> <sub>69.7</sub> 0.5
26.7	<sup>s</sup> <sub>26.53</sub> .27	<sup>"</sup> <sub>39.5</sub> 0.5	<sup>s</sup> <sub>6.68</sub> .62	<sup>"</sup> <sub>43.1</sub> 1.4	<sup>s</sup> <sub>30.29</sub> .32	<sup>"</sup> <sub>16.3</sub> 0.8	<sup>s</sup> <sub>7.15</sub> .29	<sup>"</sup> <sub>70.1</sub> 0.3
Oct. 6.6	<sup>s</sup> <sub>26.80</sub> .26	<sup>"</sup> <sub>40.0</sub> 0.4	<sup>s</sup> <sub>7.29</sub> .59	<sup>"</sup> <sub>44.6</sub> 1.7	<sup>s</sup> <sub>30.61</sub> .31	<sup>"</sup> <sub>17.0</sub> 0.8	<sup>s</sup> <sub>7.43</sub> .27	<sup>"</sup> <sub>70.4</sub> 0.2
16.6	<sup>s</sup> <sub>27.05</sub> .24	<sup>"</sup> <sub>40.3</sub> 0.2	<sup>s</sup> <sub>7.86</sub> .55	<sup>"</sup> <sub>46.5</sub> 2.0	<sup>s</sup> <sub>30.91</sub> .29	<sup>"</sup> <sub>17.8</sub> 0.8	<sup>s</sup> <sub>7.70</sub> .26	<sup>"</sup> <sub>70.5</sub> + <sup>"</sup> <sub>0.1</sub>
26.6	<sup>s</sup> <sub>27.27</sub> .22	<sup>"</sup> <sub>40.4</sub> + <sup>"</sup> <sub>0.1</sub>	<sup>s</sup> <sub>8.39</sub> .49	<sup>"</sup> <sub>48.6</sub> 2.2	<sup>s</sup> <sub>31.19</sub> .27	<sup>"</sup> <sub>18.6</sub> 0.8	<sup>s</sup> <sub>7.95</sub> .24	<sup>"</sup> <sub>70.5</sub> - <sup>"</sup> <sub>0.1</sub>
Nov. 5.6	<sup>s</sup> <sub>27.48</sub> .19	<sup>"</sup> <sub>40.5</sub> 0.0	<sup>s</sup> <sub>8.85</sub> .43	<sup>"</sup> <sub>50.9</sub> 2.4	<sup>s</sup> <sub>31.45</sub> .24	<sup>"</sup> <sub>19.4</sub> 0.8	<sup>s</sup> <sub>8.18</sub> .22	<sup>"</sup> <sub>70.3</sub> 0.2
15.5	<sup>s</sup> <sub>27.66</sub> .16	<sup>"</sup> <sub>40.4</sub> - <sup>"</sup> <sub>0.1</sub>	<sup>s</sup> <sub>9.24</sub> .35	<sup>"</sup> <sub>53.4</sub> 2.6	<sup>s</sup> <sub>31.67</sub> .21	<sup>"</sup> <sub>20.3</sub> 0.8	<sup>s</sup> <sub>8.38</sub> .19	<sup>"</sup> <sub>70.1</sub> 0.2
25.5	<sup>s</sup> <sub>27.81</sub> .13	<sup>"</sup> <sub>40.3</sub> 0.1	<sup>s</sup> <sub>9.56</sub> .27	<sup>"</sup> <sub>56.0</sub> 2.7	<sup>s</sup> <sub>31.86</sub> .17	<sup>"</sup> <sub>21.1</sub> 0.8	<sup>s</sup> <sub>8.55</sub> .16	<sup>"</sup> <sub>69.9</sub> 0.3
Dec. 5.5	<sup>s</sup> <sub>27.92</sub> .09	<sup>"</sup> <sub>40.2</sub> 0.2	<sup>s</sup> <sub>9.78</sub> .18	<sup>"</sup> <sub>58.7</sub> 2.7	<sup>s</sup> <sub>32.01</sub> .13	<sup>"</sup> <sub>21.9</sub> 0.8	<sup>s</sup> <sub>8.69</sub> .12	<sup>"</sup> <sub>69.6</sub> 0.3
15.5	<sup>s</sup> <sub>27.99</sub> .05	<sup>"</sup> <sub>40.0</sub> 0.2	<sup>s</sup> <sub>9.91</sub> + <sup>"</sup> <sub>.08</sub>	<sup>"</sup> <sub>61.4</sub> 2.6	<sup>s</sup> <sub>32.12</sub> .08	<sup>"</sup> <sub>22.8</sub> 0.8	<sup>s</sup> <sub>8.80</sub> .08	<sup>"</sup> <sub>69.3</sub> 0.3
25.4	<sup>s</sup> <sub>28.02</sub> + <sup>"</sup> <sub>.01</sub>	<sup>"</sup> <sub>39.8</sub> 0.2	<sup>s</sup> <sub>9.93</sub> - <sup>"</sup> <sub>.03</sub>	<sup>"</sup> <sub>63.9</sub> 2.5	<sup>s</sup> <sub>32.17</sub> + <sup>"</sup> <sub>.03</sub>	<sup>"</sup> <sub>23.6</sub> 0.8	<sup>s</sup> <sub>8.86</sub> + <sup>"</sup> <sub>.04</sub>	<sup>"</sup> <sub>69.0</sub> 0.3
35.4	<sup>s</sup> <sub>28.01</sub> - <sup>"</sup> <sub>.03</sub>	<sup>"</sup> <sub>39.6</sub> - <sup>"</sup> <sub>0.2</sub>	<sup>s</sup> <sub>9.86</sub> - <sup>"</sup> <sub>.13</sub>	<sup>"</sup> <sub>66.4</sub> + <sup>"</sup> <sub>2.3</sub>	<sup>s</sup> <sub>32.18</sub> - <sup>"</sup> <sub>.02</sub>	<sup>"</sup> <sub>24.3</sub> + <sup>"</sup> <sub>0.7</sub>	<sup>s</sup> <sub>8.87</sub> .00	<sup>"</sup> <sub>68.7</sub> - <sup>"</sup> <sub>0.2</sub>

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Aurigæ. (Capella.)		$\beta$ Orionis. (Rigel.)		$\beta$ Tauri.		*Groombridge 966.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 5	<sup>m</sup> 6	<sup>h</sup> 5	<sup>m</sup> 8	<sup>h</sup> 5	<sup>m</sup> 17	<sup>h</sup> 5	<sup>m</sup> 22
	<sup>s</sup> 56	<sup>s</sup> 45	<sup>s</sup> 51	<sup>s</sup> 21	<sup>s</sup> 28	<sup>s</sup> 29	<sup>s</sup> 74	<sup>s</sup> 56
Jan. 0.4	61.85 +.01	37.7 +1.5	15.19 +.01	30.0 +1.6	61.40 +.03	31.2 +0.5	17.20 -.05	60.1 +2.9
10.4	61.84 -.05	39.1 1.3	15.18 -.04	31.5 1.4	61.40 -.02	31.7 0.5	17.07 .21	62.9 2.7
20.4	61.76 .11	40.4 1.2	15.12 .08	32.8 1.2	61.36 .07	32.1 0.4	16.78 .36	65.5 2.4
30.4	61.62 .16	41.4 0.9	15.02 .12	33.9 1.0	61.27 .11	32.5 0.4	16.34 .50	67.7 2.0
Feb. 9.3	61.43 .21	42.2 0.7	14.88 .15	34.7 0.7	61.13 .15	32.8 0.3	15.77 .62	69.6 1.6
19.3	61.21 .24	42.8 0.4	14.72 .17	35.3 0.5	60.97 .18	33.0 +0.2	15.10 .70	70.9 1.1
Mar. 1.3	60.95 .26	43.1 +0.1	14.55 .18	35.7 +0.2	60.77 .20	33.1 0.0	14.36 .75	71.8 +0.6
11.2	60.69 .26	43.0 -.02	14.36 .19	35.8 0.0	60.57 .20	33.1 -.01	13.59 .77	72.1 0.0
21.2	60.43 .25	42.6 0.5	14.17 .18	35.6 -.03	60.37 .20	33.0 0.2	12.82 .76	71.8 -.05
31.2	60.18 .23	42.0 0.7	13.99 .17	35.2 0.5	60.18 .18	32.7 0.3	12.08 .70	71.1 1.0
Apr. 10.2	59.97 .19	41.2 1.0	13.84 .14	34.5 0.8	60.00 .16	32.3 0.4	11.41 .62	67.8 1.5
20.1	59.80 .15	40.1 1.1	13.71 .11	33.6 1.0	59.87 .12	31.9 0.4	10.84 .51	63.1 1.9
30.1	59.68 .09	38.9 1.3	13.62 .07	32.5 1.2	59.77 .08	31.5 0.4	10.30 .38	66.1 2.2
May 10.1	59.61 -.03	37.6 1.3	13.56 -.03	31.2 1.5	59.71 -.03	31.1 0.4	10.07 .24	63.8 2.4
20.1	59.61 +.03	36.2 1.3	13.55 +.01	29.6 1.6	59.71 +.02	30.6 0.4	9.91 -.09	61.3 2.5
30.0	59.67 .09	34.9 1.3	13.59 .05	27.9 1.8	59.75 .07	30.3 0.3	9.90 +.07	58.7 2.6
June 9.0	59.79 .15	33.7 1.2	13.66 .10	26.0 1.9	59.84 .12	30.0 0.2	10.04 .22	56.1 2.6
19.0	59.97 .20	32.6 1.1	13.78 .14	24.1 2.0	59.98 .16	29.9 -.01	10.34 .37	53.6 2.5
28.9	60.20 .25	31.6 0.9	13.93 .17	22.1 2.0	60.17 .20	29.8 0.0	10.78 .50	51.2 2.3
July 8.9	60.47 .30	30.8 0.7	14.12 .20	20.1 2.0	60.39 .24	29.9 +0.1	11.35 .62	49.0 2.1
18.9	60.79 .33	30.2 0.5	14.34 .23	18.1 1.9	60.64 .26	30.0 0.2	12.03 .73	47.1 1.8
28.9	61.14 .36	29.8 0.3	14.58 .25	16.3 1.7	60.91 .29	30.3 0.3	12.81 .82	45.5 1.5
Aug. 7.8	61.51 .38	29.5 -.01	14.84 .27	14.7 1.5	61.21 .31	30.6 0.4	13.68 .90	44.2 1.1
17.8	61.90 .40	29.5 +0.1	15.12 .28	13.3 1.3	61.52 .32	31.0 0.4	14.61 .95	43.3 0.7
27.8	62.30 .40	29.7 0.3	15.39 .28	12.2 0.9	61.84 .32	31.4 0.4	15.58 .99	42.7 -.03
Sept. 6.8	62.70 .41	30.1 0.4	15.67 .28	11.4 0.8	62.17 .33	31.8 0.4	16.59 1.01	42.6 +0.1
16.7	63.11 .40	30.6 0.6	15.96 .28	11.0 -.02	62.50 .33	32.3 0.4	17.61 1.02	42.8 0.5
26.7	63.51 .39	31.3 0.8	16.23 .27	11.0 +0.1	62.82 .32	32.7 0.4	18.63 1.00	43.5 0.8
Oct. 6.7	63.90 .38	32.2 0.9	16.50 .26	11.3 0.5	63.13 .31	33.1 0.4	19.62 .97	44.5 1.2
16.6	64.27 .36	33.2 1.1	16.76 .25	11.9 0.8	63.44 .30	33.5 0.4	20.57 .92	46.0 1.6
26.6	64.62 .34	34.3 1.2	17.00 .23	13.0 1.1	63.73 .28	33.9 0.4	21.46 .85	47.8 2.0
Nov. 5.6	64.94 .31	35.6 1.3	17.22 .21	14.2 1.4	64.00 .26	34.3 0.4	22.27 .76	49.9 2.3
15.6	65.23 .27	36.9 1.4	17.41 .18	15.7 1.6	64.25 .23	34.7 0.4	22.99 .65	52.3 2.5
25.5	65.47 .22	38.4 1.5	17.58 .15	17.3 1.7	64.46 .20	35.1 0.4	23.58 .53	55.0 2.8
Dec. 5.5	65.67 .17	39.9 1.5	17.71 .11	19.0 1.7	64.64 .16	35.6 0.5	24.04 .38	57.8 2.9
15.5	65.81 .12	41.4 1.5	17.81 .07	20.8 1.7	64.77 .11	36.0 0.5	24.34 .23	60.8 3.0
25.5	65.90 +.05	43.0 1.5	17.86 +.03	22.4 1.6	64.86 .07	36.5 0.5	24.50 +.07	63.8 2.9
35.4	65.92 -.01	44.5 +1.4	17.87 -.01	24.0 +1.5	64.90 +.02	37.0 +0.5	24.48 -.10	66.7 +2.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\delta$ Orionis.		$\alpha$ Leporis.		$\epsilon$ Orionis.		$\eta$ Columbae.	
	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 5 <sup>m</sup> 25	<sup>°</sup> 0 <sup>'</sup> 23	<sup>h</sup> 5 <sup>m</sup> 26	<sup>°</sup> 17 <sup>'</sup> 54	<sup>h</sup> 5 <sup>m</sup> 29	<sup>°</sup> 1 <sup>'</sup> 17	<sup>h</sup> 5 <sup>m</sup> 34	<sup>°</sup> 34 <sup>'</sup> 8
Jan. 0.4	19.53 +.03	65.3 +1.2	57.99 +.01	76.8 +2.1	34.64 +.03	26.8 +1.3	55.51 -.01	54.7 +2.8
10.4	19.53 -.02	66.4 1.1	57.98 -.04	78.8 1.9	34.65 -.02	28.0 1.1	55.48 .06	57.3 2.5
20.4	19.49 .06	67.4 0.9	57.92 .08	80.6 1.6	34.61 .06	29.1 1.0	55.39 .11	59.7 2.2
30.4	19.41 .10	68.3 0.8	57.82 .12	82.1 1.3	34.53 .10	30.0 0.8	55.26 .16	61.7 1.8
Feb. 9.3	19.29 .13	68.9 0.6	57.68 .15	83.3 1.0	34.41 .13	30.7 0.6	55.08 .19	63.3 1.4
19.3	19.14 .16	69.4 0.4	57.52 .18	84.1 0.7	34.27 .16	31.2 0.4	54.88 .23	64.5 1.0
Mar. 1.3	18.97 .18	69.8 +0.2	57.33 .20	84.7 +0.4	34.10 .18	31.5 +0.2	54.65 .24	65.3 0.5
11.3	18.79 .18	69.9 0.0	57.13 .20	84.9 0.0	33.92 .18	31.7 0.0	54.40 .25	65.6 +0.1
21.2	18.61 .18	69.8 -0.1	56.92 .20	84.7 -0.3	33.73 .18	31.6 -0.1	54.15 .25	65.4 -0.4
31.2	18.43 .17	69.6 0.3	56.73 .19	84.2 0.6	33.55 .17	31.4 0.3	53.91 .23	64.8 0.8
Apr. 10.2	18.27 .14	69.2 0.5	56.55 .16	83.4 1.0	33.39 .15	30.9 0.5	53.69 .21	63.8 1.2
20.1	18.14 .12	68.6 0.7	56.40 .13	82.3 1.3	33.26 .12	30.3 0.7	53.50 .18	62.3 1.6
30.1	18.04 .08	67.8 0.9	56.28 .10	80.9 1.5	33.16 .08	29.5 0.9	53.33 .14	60.5 2.0
May 10.1	17.98 -.03	66.9 1.0	56.21 .06	79.3 1.8	33.10 -.04	28.6 1.1	53.21 .10	58.4 2.3
20.1	17.96 .00	65.8 1.2	56.17 -.02	77.4 2.0	33.07 .00	27.4 1.2	53.14 -.05	56.0 2.5
30.0	17.99 +.05	64.5 1.3	56.17 +.03	75.3 2.2	33.09 +.04	26.1 1.4	53.11 .00	53.3 2.8
June 9.0	18.06 .09	63.1 1.4	56.22 .07	73.0 2.3	33.15 .08	24.7 1.5	53.13 +.05	50.4 2.9
19.0	18.16 .12	61.6 1.5	56.32 .11	70.6 2.4	33.26 .12	23.2 1.6	53.20 .09	47.5 3.0
29.0	18.30 .16	60.1 1.6	56.45 .15	68.2 2.4	33.40 .16	21.6 1.6	53.32 .13	44.5 3.0
July 8.9	18.48 .19	58.5 1.6	56.62 .18	65.9 2.3	33.57 .19	20.0 1.6	53.47 .17	41.5 2.9
18.9	18.69 .22	56.9 1.5	56.82 .21	63.6 2.2	33.77 .22	18.4 1.5	53.67 .21	38.7 2.7
28.9	18.93 .24	55.4 1.4	57.04 .24	61.4 2.0	34.00 .24	16.9 1.5	53.90 .25	36.1 2.5
Aug. 7.8	19.18 .26	54.1 1.3	57.29 .26	59.5 1.8	34.25 .26	15.5 1.3	54.16 .27	33.8 2.2
17.8	19.44 .27	52.9 1.1	57.56 .27	57.9 1.4	34.51 .27	14.3 1.1	54.44 .29	31.8 1.7
27.8	19.72 .28	51.9 0.8	57.83 .28	56.6 1.1	34.79 .28	13.3 0.9	54.74 .31	30.3 1.3
Sept. 6.8	20.00 .28	51.2 0.6	58.12 .29	55.8 0.7	35.07 .28	12.6 0.6	55.05 .31	29.3 0.8
16.7	20.29 .28	50.8 -0.3	58.41 .29	55.3 -0.2	35.35 .28	12.1 -0.3	55.36 .29	28.8 -0.2
26.7	20.57 .28	50.7 0.0	58.70 .28	55.3 +0.2	35.63 .28	12.0 0.0	55.68 .31	28.9 +0.4
Oct. 6.7	20.84 .27	50.8 +0.3	58.98 .28	55.8 0.7	35.91 .27	12.2 +0.3	55.99 .30	29.5 0.9
16.7	21.11 .26	51.3 0.6	59.25 .28	56.7 1.1	36.18 .26	12.7 0.6	56.29 .29	30.7 1.4
26.6	21.36 .24	52.0 0.8	59.50 .25	58.0 1.5	36.43 .25	13.5 0.9	56.57 .27	32.4 1.9
Nov. 5.6	21.60 .23	53.0 1.0	59.74 .22	59.6 1.8	36.67 .23	14.5 1.1	56.82 .24	34.5 2.3
15.6	21.81 .20	54.1 1.2	59.95 .19	61.5 2.0	36.89 .20	15.7 1.3	57.05 .21	37.0 2.6
25.5	22.00 .17	55.4 1.3	60.13 .16	63.7 2.2	37.08 .17	17.0 1.4	57.24 .17	39.7 2.8
Dec. 5.5	22.15 .14	56.7 1.3	60.27 .12	65.9 2.2	37.23 .14	18.4 1.4	57.38 .12	42.6 2.9
15.5	22.27 .10	58.0 1.3	60.38 .08	68.2 2.2	37.36 .10	19.8 1.4	57.49 .08	45.6 2.9
25.5	22.34 .06	59.3 1.2	60.44 +.04	70.4 2.2	37.44 .06	21.1 1.3	57.54 +.02	48.5 2.8
35.4	22.38 +.01	60.5 +1.1	60.46 .00	72.5 +2.0	37.47 +.02	22.4 +1.2	57.53 -.03	51.2 +2.7



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	<i>α</i> Orionis.		*22 Camelopardalis.		μ Geminorum.		<i>α</i> Argus. ( <i>Canopus</i> .)	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 5 <sup>m</sup> 48	<sup>°</sup> 7 <sup>'</sup> 22	<sup>h</sup> 6 <sup>m</sup> 4	<sup>°</sup> 69 <sup>'</sup> 21	<sup>h</sup> 6 <sup>m</sup> 15	<sup>°</sup> 22 <sup>'</sup> 34	<sup>h</sup> 6 <sup>m</sup> 21	<sup>°</sup> 52 <sup>'</sup> 37
	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>
Jan. 0.5	5.45 +.05	39.2 -0.8	26.56 +.11	33.8 +2.7	2.79 +.09	32.2 0.0	4.75 .00	39.5 +3.4
10.5	5.48 +.01	38.4 0.7	26.60 -.02	36.4 2.6	2.85 +.04	32.3 +0.1	4.72 -.07	42.9 3.2
20.4	5.46 -.04	37.8 0.6	26.52 .15	39.0 2.5	2.86 -.01	32.5 0.2	4.61 .14	46.0 2.9
30.4	5.40 .08	37.2 0.5	26.31 .26	41.4 2.2	2.82 .06	32.7 0.2	4.44 .20	48.7 2.6
Feb. 9.4	5.30 .12	36.8 0.4	25.99 .37	43.4 1.9	2.74 .11	32.9 0.3	4.21 .26	51.1 2.2
19.3	5.17 .15	36.5 0.3	25.58 .45	45.1 1.5	2.61 .14	33.2 0.2	3.93 .30	53.1 1.7
Mar. 1.3	5.00 .17	36.3 -0.1	25.09 .51	46.4 1.0	2.45 .17	33.4 0.2	3.61 .33	54.5 1.2
11.3	4.82 .18	36.2 0.0	24.56 .55	47.2 0.5	2.27 .19	33.6 0.2	3.26 .36	55.5 0.7
21.3	4.64 .18	36.2 +0.1	24.00 .55	47.5 +0.1	2.08 .19	33.7 0.1	2.90 .36	55.9 +0.2
31.2	4.46 .17	36.3 0.2	23.45 .54	47.3 -0.4	1.88 .19	33.8 +0.1	2.53 .36	55.8 -0.4
Apr. 10.2	4.30 .15	36.6 0.3	22.93 .49	46.6 0.9	1.70 .17	33.9 0.0	2.18 .34	55.1 0.9
20.2	4.16 .13	36.9 0.4	22.46 .43	45.5 1.3	1.54 .14	33.9 0.0	1.85 .31	54.0 1.4
30.2	4.05 .09	37.4 0.5	22.07 .35	44.0 1.7	1.41 .11	33.8 -0.1	1.56 .27	52.4 1.8
May 10.1	3.97 .05	37.9 0.6	21.77 .25	42.1 2.0	1.32 .07	33.8 0.1	1.30 .23	50.4 2.2
20.1	3.94 -.01	38.6 0.7	21.58 .14	40.0 2.2	1.26 -.03	33.7 -0.1	1.10 .18	48.0 2.6
30.1	3.95 +.03	39.4 0.9	21.49 -.03	37.8 2.3	1.25 +.01	33.7 0.0	0.95 .12	45.2 2.9
June 9.0	4.00 .07	40.3 0.9	21.51 +.08	35.4 2.4	1.29 .06	33.7 0.0	0.86 -.06	42.2 3.1
19.0	4.09 .11	41.3 1.0	21.65 .19	33.0 2.4	1.37 .10	33.7 +0.1	0.83 .00	39.0 3.3
29.0	4.22 .15	42.4 1.1	21.89 .30	30.6 2.3	1.49 .14	33.8 0.1	0.87 +.06	35.7 3.3
July 9.0	4.39 .18	43.5 1.1	22.23 .39	28.4 2.2	1.64 .17	33.9 0.1	0.96 .12	32.3 3.3
18.9	4.59 .21	44.6 1.1	22.67 .48	26.2 2.0	1.83 .21	34.1 0.2	1.11 .18	29.1 3.2
28.9	4.81 .23	45.7 1.0	23.19 .55	24.4 1.8	2.05 .23	34.3 0.2	1.31 .23	26.0 3.0
Aug. 7.9	5.05 .25	46.7 0.9	23.78 .62	22.7 1.5	2.30 .26	34.5 0.2	1.57 .26	23.1 2.7
17.9	5.31 .27	47.5 0.8	24.42 .67	21.3 1.2	2.57 .26	34.7 0.2	1.87 .32	20.6 2.3
27.8	5.59 .28	48.3 0.6	25.12 .72	20.3 0.9	2.85 .29	34.8 0.1	2.20 .35	18.6 1.8
Sept. 6.8	5.87 .29	48.8 0.5	25.85 .75	19.6 0.6	3.15 .30	34.9 +0.1	2.57 .36	17.1 1.2
16.8	6.16 .29	49.2 +0.2	26.61 .76	19.2 -0.2	3.45 .31	35.0 0.0	2.96 .40	16.1 -0.6
26.7	6.44 .29	49.3 0.0	27.38 .77	19.2 +0.2	3.77 .32	34.9 -0.1	3.36 .40	15.8 0.0
Oct. 6.7	6.73 .28	49.2 -0.2	28.15 .76	19.5 0.5	4.09 .31	34.8 0.2	3.77 .40	16.1 +0.6
16.7	7.01 .28	48.9 0.4	28.91 .75	20.2 0.9	4.40 .31	34.6 0.2	4.17 .39	17.1 1.3
26.7	7.28 .26	48.4 0.6	29.64 .71	21.3 1.3	4.70 .30	34.4 0.2	4.55 .37	18.7 1.8
Nov. 5.6	7.54 .25	47.7 0.8	30.33 .66	22.7 1.6	5.00 .29	34.1 0.3	4.91 .34	20.8 2.4
15.6	7.78 .22	46.8 0.9	30.97 .59	24.5 1.9	5.28 .27	33.9 0.2	5.23 .30	23.4 2.8
25.6	7.99 .20	45.9 0.9	31.52 .52	26.6 2.2	5.53 .24	33.7 0.2	5.50 .24	26.4 3.2
Dec. 5.6	8.17 .16	45.0 0.9	32.00 .42	28.9 2.4	5.76 .21	33.5 0.2	5.71 .18	29.7 3.4
15.5	8.31 .13	44.1 0.9	32.36 .31	31.4 2.6	5.95 .17	33.4 -0.1	5.86 .12	33.1 3.5
25.5	8.42 .08	43.2 0.9	32.62 .19	34.1 2.7	6.10 .12	33.3 0.0	5.95 +.05	36.6 3.5
35.5	8.48 +.04	42.4 -0.8	32.74 +.06	36.8 +2.7	6.19 +.07	33.3 +0.1	5.96 -.02	40.0 +3.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma$ Geminorum.		$\alpha$ Canis Majoris. (Sirius.)		$\epsilon$ Canis Majoris.		$\delta$ Canis Majoris.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 6 <sup>m</sup> 30	<sup>°</sup> 16 <sup>'</sup> 30	<sup>h</sup> 6 <sup>m</sup> 39	<sup>°</sup> 16 <sup>'</sup> 32	<sup>h</sup> 6 <sup>m</sup> 53	<sup>°</sup> 28 <sup>'</sup> 47	<sup>h</sup> 7 <sup>m</sup> 3	<sup>°</sup> 26 <sup>'</sup> 11
Jan. 0.5	9.29 +.10	22.3 -0.4	23.33 +.08	25.8 +2.3	29.82 +.08	52.7 +2.9	4.99 +.10	19.2 +2.8
10.5	9.36 +.05	21.9 0.3	23.39 +.03	28.1 2.2	29.88 +.03	55.5 2.7	5.07 +.05	22.0 2.7
20.5	9.39 .00	21.7 0.2	23.39 -.02	30.2 2.0	29.89 -.02	58.2 2.5	5.09 -.01	24.6 2.5
30.4	9.36 -.05	21.6 -0.1	23.35 .06	32.0 1.7	29.84 .07	60.6 2.2	5.05 .06	26.9 2.2
Feb. 9.4	9.29 .09	21.6 0.0	23.27 .11	33.6 1.4	29.74 .12	62.7 1.9	4.97 .10	29.0 1.9
19.4	9.18 .13	21.6 +0.1	23.14 .14	34.9 1.1	29.60 .16	64.4 1.6	4.84 .15	30.7 1.6
Mar. 1.3	9.03 .16	21.7 0.1	22.98 .17	35.9 0.8	29.43 .19	65.8 1.2	4.68 .18	32.0 1.2
11.3	8.86 .18	21.9 0.1	22.80 .19	36.5 0.5	29.22 .21	66.7 0.8	4.49 .20	33.1 0.8
21.3	8.68 .19	22.0 0.1	22.60 .20	36.8 +0.2	29.01 .22	67.3 +0.3	4.28 .21	33.6 +0.4
31.3	8.49 .18	22.2 0.2	22.40 .20	36.8 -0.2	28.78 .22	67.4 -0.1	4.07 .22	33.8 0.0
Apr. 10.2	8.31 .17	22.3 0.2	22.21 .19	36.5 0.5	28.56 .22	67.2 0.5	3.85 .21	33.6 -0.4
20.2	8.15 .15	22.5 0.2	22.03 .17	35.8 0.8	28.35 .20	66.5 0.8	3.65 .19	33.0 0.8
30.2	8.02 .12	22.7 0.2	21.87 .14	34.9 1.1	28.16 .17	65.5 1.2	3.47 .17	32.1 1.1
May 10.2	7.92 .08	22.9 0.2	21.75 .11	33.7 1.3	28.00 .14	64.0 1.6	3.31 .14	30.8 1.5
20.1	7.86 -.04	23.1 0.3	21.66 .07	32.2 1.6	27.88 .11	62.3 1.9	3.19 .10	29.2 1.7
30.1	7.83 .00	23.4 0.3	21.60 -.04	30.6 1.8	27.79 .07	60.3 2.1	3.10 .07	27.3 2.0
June 9.1	7.85 +.04	23.7 0.3	21.59 +.01	28.7 1.9	27.75 -.03	58.0 2.4	3.05 -.03	25.2 2.2
19.0	7.91 .08	24.1 0.4	21.61 .04	26.7 2.1	27.74 +.02	55.6 2.5	3.04 +.01	22.9 2.4
29.0	8.01 .12	24.5 0.4	21.69 .08	24.6 2.1	27.78 .06	53.0 2.6	3.07 .05	20.4 2.5
July 9.0	8.15 .15	24.9 0.4	21.78 .12	22.4 2.1	27.86 .10	50.3 2.6	3.14 .09	17.9 2.5
19.0	8.32 .18	25.4 0.4	21.91 .15	20.3 2.1	27.97 .13	47.7 2.6	3.25 .13	15.4 2.5
28.9	8.52 .21	25.8 0.4	22.08 .18	18.3 1.9	28.12 .17	45.2 2.5	3.39 .16	12.9 2.4
Aug. 7.9	8.74 .24	26.2 0.4	22.27 .21	16.4 1.8	28.31 .20	42.8 2.2	3.57 .19	10.7 2.2
17.9	8.99 .25	26.6 0.3	22.49 .23	14.7 1.5	28.52 .23	40.7 1.9	3.77 .22	8.6 1.9
27.9	9.25 .27	26.9 0.2	22.73 .25	13.4 1.2	28.76 .25	38.9 1.6	4.00 .24	6.9 1.5
Sept. 6.8	9.53 .28	27.0 +0.1	22.99 .26	12.4 0.8	29.03 .27	37.5 1.1	4.25 .26	5.6 1.1
16.8	9.82 .29	27.0 0.0	23.26 .28	11.8 -0.4	29.31 .29	36.6 0.7	4.53 .28	4.7 0.7
26.8	10.12 .30	26.9 -0.2	23.54 .29	11.6 +0.1	29.60 .30	36.2 -0.1	4.82 .30	4.2 -0.2
Oct. 6.7	10.42 .31	26.7 0.3	23.83 .29	11.9 0.5	29.91 .31	36.4 +0.4	5.12 .30	4.3 +0.4
16.7	10.73 .30	26.3 0.4	24.12 .29	12.6 0.9	30.22 .31	37.0 0.9	5.43 .31	4.9 0.9
26.7	11.03 .30	25.9 0.5	24.41 .28	13.8 1.3	30.53 .30	38.2 1.4	5.73 .30	6.0 1.4
Nov. 5.7	11.32 .29	25.3 0.6	24.69 .27	15.3 1.7	30.83 .29	39.9 1.9	6.03 .29	7.6 1.6
15.6	11.60 .27	24.7 0.6	24.95 .25	17.2 2.0	31.11 .27	42.0 2.3	6.31 .27	9.6 2.2
25.6	11.86 .24	24.1 0.6	25.19 .23	19.3 2.2	31.37 .24	44.4 2.6	6.58 .25	12.0 2.5
Dec. 5.6	12.09 .21	23.5 0.6	25.40 .19	21.6 2.3	31.59 .21	47.1 2.8	6.81 .22	14.6 2.7
15.6	12.28 .18	22.9 0.5	25.58 .16	24.0 2.4	31.78 .17	49.9 2.9	7.01 .18	17.3 2.8
25.5	12.44 .13	22.5 0.4	25.71 .11	26.3 2.4	31.93 .12	52.8 2.9	7.16 .13	20.2 2.8
35.5	12.55 +.09	22.1 -0.3	25.80 +.07	28.7 +2.3	32.02 +.07	55.7 +2.8	7.27 +.08	23.0 +2.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\delta$ Geminorum.		*Piazzii vii. 67.		$\alpha$ Geminorum. (Castor.)		$\alpha$ Canis Minoris. (Procyon.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 7 <sup>m</sup> 12	<sup>°</sup> 22 <sup>'</sup> 13	<sup>h</sup> 7 <sup>m</sup> 17	<sup>°</sup> 68 <sup>'</sup> 43	<sup>h</sup> 7 <sup>m</sup> 26	<sup>°</sup> 32 <sup>'</sup> 10	<sup>h</sup> 7 <sup>m</sup> 32	<sup>°</sup> 5 <sup>'</sup> 33
Jan. 0.5	18.50 +.15	6.6 -0.1	15.44 +.30	32.9 +2.5	14.62 +.18	13.8 +0.4	27.29 +.15	23.4 -1.3
10.5	18.62 .10	6.5 0.0	15.68 .17	35.4 2.6	14.77 .12	14.4 0.6	27.42 .10	22.2 1.1
20.5	18.69 +.04	6.6 +0.1	15.79 +.05	38.1 2.6	14.86 .06	15.0 0.7	27.50 +.05	21.1 0.9
30.5	18.71 -.01	6.8 0.3	15.77 -.08	40.7 2.6	14.90 +.01	15.8 0.8	27.53 .00	20.3 0.8
Feb. 9.4	18.67 .06	7.1 0.3	15.63 .20	43.2 2.4	14.88 -.05	16.5 0.9	27.51 -.04	19.6 0.6
19.4	18.58 .10	7.4 0.4	15.37 .31	45.5 2.2	14.80 .10	17.5 0.9	27.44 .09	19.1 0.4
Mar. 1.4	18.46 .14	7.8 0.4	15.02 .40	47.6 1.8	14.68 .14	18.4 0.8	27.33 .12	18.8 0.2
11.3	18.31 .17	8.2 0.4	14.58 .46	49.2 1.4	14.52 .17	19.2 0.7	27.19 .15	18.7 -0.1
21.3	18.13 .18	8.6 0.4	14.09 .50	50.4 1.0	14.33 .19	19.8 0.6	27.03 .17	18.6 +0.1
31.3	17.94 .19	9.0 0.3	13.57 .52	51.1 +0.5	14.13 .20	20.4 0.5	26.86 .17	18.8 0.2
Apr. 10.3	17.76 .18	9.3 0.2	13.05 .52	51.3 0.0	13.92 .20	20.7 0.3	26.69 .17	19.0 0.3
20.2	17.58 .16	9.5 0.2	12.54 .49	51.1 -0.5	13.73 .19	20.9 +0.1	26.52 .16	19.3 0.4
30.2	17.43 .14	9.6 0.1	12.08 .43	50.4 0.9	13.55 .16	21.0 0.0	26.37 .14	19.7 0.5
May 10.2	17.30 .11	9.7 0.1	11.67 .37	49.2 1.4	13.40 .13	20.9 -0.2	26.24 .12	20.3 0.6
20.2	17.21 .07	9.8 +0.1	11.34 .28	47.7 1.7	13.29 .10	20.6 0.3	26.14 .09	20.9 0.6
30.1	17.15 -.04	9.8 0.0	11.10 .19	45.8 2.0	13.21 .06	20.3 0.4	26.06 .05	21.6 0.7
June 9.1	17.13 .00	9.9 0.0	10.96 -.09	43.7 2.2	13.17 -.01	19.8 0.5	26.03 -.02	22.3 0.8
19.1	17.16 +.04	9.8 0.0	10.92 +.01	41.4 2.4	13.18 +.03	19.2 0.6	26.03 +.02	23.2 0.8
29.0	17.22 .08	9.8 0.0	10.98 .11	38.9 2.5	13.23 .07	18.6 0.6	26.06 .05	24.0 0.9
July 9.0	17.32 .12	9.8 0.0	11.13 .21	36.5 2.5	13.33 .11	18.0 0.7	26.13 .09	24.9 0.9
19.0	17.46 .15	9.8 0.0	11.39 .30	33.9 2.5	13.46 .15	17.3 0.7	26.23 .12	25.7 0.8
29.0	17.62 .18	9.7 -0.1	11.73 .38	31.5 2.4	13.62 .18	16.7 0.7	26.36 .15	26.5 0.8
Aug. 7.9	17.82 .21	9.6 0.1	12.15 .46	29.2 2.2	13.82 .21	16.0 0.7	26.52 .17	27.2 0.7
17.9	18.04 .23	9.5 0.2	12.65 .53	27.0 2.1	14.05 .24	15.2 0.7	26.71 .20	27.8 0.5
27.9	18.29 .26	9.3 0.2	13.22 .60	25.0 1.9	14.31 .27	14.5 0.7	26.92 .22	28.2 0.3
Sept. 6.9	18.56 .28	9.0 0.3	13.85 .65	23.3 1.6	14.59 .29	13.8 0.7	27.15 .24	28.5 +0.1
16.8	18.84 .29	8.7 0.4	14.52 .69	21.8 1.3	14.89 .31	13.0 0.7	27.40 .26	28.5 -0.1
26.8	19.14 .31	8.2 0.5	15.23 .73	20.7 1.0	15.21 .33	12.3 0.7	27.66 .27	28.3 0.3
Oct. 6.8	19.45 .32	7.7 0.6	15.97 .75	19.9 0.6	15.54 .34	11.6 0.7	27.95 .29	27.8 0.6
16.7	19.77 .32	7.1 0.6	16.73 .76	19.5 -0.2	15.89 .35	10.9 0.7	28.24 .30	27.1 0.8
26.7	20.09 .32	6.4 0.7	17.49 .76	19.4 +0.2	16.24 .35	10.2 0.6	28.54 .30	26.2 1.0
Nov. 5.7	20.41 .32	5.8 0.7	18.24 .74	19.8 0.6	16.59 .35	9.7 0.5	28.84 .30	25.0 1.2
15.7	20.73 .31	5.1 0.6	18.97 .70	20.6 1.0	16.94 .34	9.2 0.4	29.13 .29	23.7 1.3
25.6	21.03 .29	4.5 0.6	19.65 .65	21.8 1.4	17.27 .32	8.9 0.2	29.41 .27	22.4 1.4
Dec. 5.6	21.30 .26	4.0 0.5	20.26 .57	23.3 1.7	17.58 .29	8.7 -0.1	29.68 .25	20.9 1.4
15.6	21.54 .28	3.5 0.4	20.79 .48	25.2 2.1	17.86 .26	8.8 +0.1	29.91 .22	19.5 1.4
25.6	21.74 .18	3.2 0.2	21.23 .38	27.5 2.3	18.10 .21	9.0 0.3	30.11 .18	18.1 1.3
35.5	21.90 +.13	3.1 -0.1	21.55 +.27	29.8 +2.4	18.28 +.17	9.4 +0.5	30.27 +.14	16.8 -1.2

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Geminorum. (Pollux.)		$\phi$ Geminorum.		*3 Ursæ Majoris (H.)		15 Argus ( $\epsilon$ ).	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> <sup>m</sup> 7 37	<sup>°</sup> <sup>'</sup> 28 20	<sup>h</sup> <sup>m</sup> 7 45	<sup>°</sup> <sup>'</sup> 27 5	<sup>h</sup> <sup>m</sup> 7 59	<sup>°</sup> <sup>'</sup> 68 50	<sup>h</sup> <sup>m</sup> 8 1	<sup>°</sup> <sup>'</sup> 23 55
Jan. 0.5	18.40 +.18	15.5 +0.1	29.22 +.19	58.6 0.0	46.13 +.41	68.6 +2.2	58.93 +.16	44.8 +2.8
10.5	18.55 .13	15.7 0.3	29.38 .14	58.7 +0.2	46.48 .39	70.9 2.5	59.07 .11	47.6 2.7
20.5	18.65 .07	16.1 0.5	29.49 .08	59.0 0.4	46.71 .16	73.5 2.6	59.16 .06	50.3 2.6
30.5	18.69 +.01	16.6 0.6	29.54 +.03	59.4 0.5	46.80 +.03	76.2 2.7	59.19 +.01	52.8 2.4
Feb. 9.4	18.68 -.04	17.3 0.7	29.54 -.03	60.0 0.6	46.77 -.10	78.8 2.6	59.17 -.05	55.1 2.1
19.4	18.61 .09	18.0 0.7	29.48 .08	60.7 0.7	46.61 .31	81.4 2.5	59.10 .09	57.0 1.8
Mar. 1.4	18.50 .13	18.7 0.7	29.38 .12	61.4 0.7	46.34 .31	83.8 2.2	58.99 .13	58.7 1.5
11.3	18.35 .16	19.4 0.7	29.24 .15	62.1 0.7	45.97 .40	85.8 1.9	58.84 .16	60.0 1.2
21.3	18.18 .18	20.1 0.6	29.07 .18	62.7 0.6	45.53 .46	87.5 1.5	58.67 .18	61.0 0.8
31.3	17.99 .19	20.6 0.5	28.89 .19	63.3 0.5	45.05 .50	88.7 1.0	58.48 .19	61.6 +0.4
Apr. 10.3	17.79 .19	21.0 0.4	28.70 .19	63.8 0.4	44.53 .51	89.5 +0.5	58.28 .20	61.8 0.0
20.2	17.60 .18	21.3 0.2	28.51 .18	64.1 0.3	44.02 .51	89.8 0.0	58.08 .19	61.7 -0.3
30.2	17.43 .16	21.5 +0.1	28.34 .16	64.3 0.2	43.52 .47	89.6 -0.5	57.90 .18	61.2 0.7
May 10.2	17.29 .13	21.6 0.0	28.20 .13	64.4 +0.1	43.07 .42	88.9 0.9	57.73 .16	60.4 1.0
20.2	17.17 .10	21.5 -0.1	28.08 .10	64.4 0.0	42.68 .35	87.7 1.3	57.58 .13	59.2 1.3
30.1	17.09 .06	21.3 0.2	28.00 .06	64.3 -0.1	42.36 .28	86.2 1.7	57.46 .10	57.8 1.6
June 9.1	17.05 -.02	21.1 0.3	27.95 -.02	64.2 0.2	42.12 .19	84.3 2.0	57.38 .07	56.1 1.8
19.1	17.05 +.02	20.7 0.4	27.95 +.01	63.9 0.3	41.98 -1.0	82.2 2.3	57.32 -.04	54.2 2.0
29.0	17.09 .06	20.3 0.4	27.98 .05	63.6 0.4	41.93 .00	79.8 2.4	57.30 .00	52.1 2.2
July 9.0	17.17 .10	19.9 0.5	28.05 .09	63.2 0.4	41.98 +.10	77.3 2.6	57.32 +.03	49.9 2.3
19.0	17.28 .13	19.4 0.5	28.16 .12	62.8 0.4	42.13 .19	74.7 2.6	57.37 .07	47.6 2.3
29.0	17.43 .17	18.9 0.5	28.30 .16	62.3 0.5	42.36 .27	72.0 2.6	57.45 .10	45.4 2.2
Aug. 7.9	17.61 .20	18.4 0.6	28.47 .19	61.8 0.5	42.68 .37	69.4 2.6	57.57 .13	43.2 2.1
17.9	17.82 .22	17.8 0.6	28.67 .22	61.2 0.6	43.09 .44	66.9 2.5	57.72 .17	41.2 1.9
27.9	18.06 .25	17.1 0.7	28.90 .24	60.6 0.7	43.57 .52	64.4 2.3	57.90 .19	39.4 1.6
Sept. 6.9	18.32 .27	16.4 0.7	29.16 .26	59.9 0.7	44.12 .58	62.2 2.1	58.11 .22	38.0 1.2
16.8	18.61 .29	15.7 0.7	29.43 .29	59.2 0.8	44.73 .64	60.2 1.9	58.34 .25	36.9 0.8
26.8	18.91 .31	15.0 0.8	29.73 .31	58.4 0.8	45.40 .69	58.5 1.6	58.60 .27	36.3 -0.4
Oct. 6.8	19.23 .32	14.2 0.8	30.04 .32	57.5 0.8	46.10 .72	57.0 1.3	58.88 .29	36.1 +0.1
16.7	19.56 .34	13.4 0.8	30.37 .33	56.7 0.9	46.84 .75	55.9 0.9	59.18 .30	36.5 0.6
26.7	19.90 .34	12.6 0.8	30.70 .34	55.8 0.9	47.61 .77	55.2 0.5	59.49 .31	37.3 1.1
Nov. 5.7	20.24 .34	11.9 0.7	31.05 .34	55.0 0.8	48.38 .77	54.9 -0.1	59.80 .31	38.6 1.5
15.7	20.58 .33	11.2 0.6	31.38 .33	54.2 0.7	49.14 .75	55.1 +0.4	60.11 .31	40.4 2.0
25.6	20.90 .32	10.7 0.5	31.71 .32	53.5 0.6	49.87 .71	55.7 0.8	60.41 .29	42.5 2.3
Dec. 5.6	21.21 .29	10.2 0.3	32.02 .29	53.0 0.4	50.55 .65	56.7 1.3	60.69 .27	44.9 2.5
15.6	21.48 .26	10.0 -0.2	32.30 .26	52.6 0.3	51.17 .57	58.2 1.7	60.94 .23	47.6 2.7
25.6	21.72 .21	9.9 0.0	32.55 .23	52.4 -0.1	51.70 .48	60.1 2.0	61.16 .19	50.3 2.8
35.5	21.91 +.17	10.1 +0.1	32.74 +.18	52.5 +0.1	52.13 +.37	62.3 +2.3	61.33 +.15	53.2 +2.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\epsilon$ Hydræ.		$\zeta$ Ursæ Majoris.		* $\sigma^2$ Ursæ Majoris.		$\kappa$ Cancrî.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 8 <sup>m</sup> 39	<sup>°</sup> 6 <sup>'</sup> 53	<sup>h</sup> 8 <sup>m</sup> 50	<sup>°</sup> 48 <sup>'</sup> 32	<sup>h</sup> 8 <sup>m</sup> 58	<sup>°</sup> 67 <sup>'</sup> 39	<sup>h</sup> 9 <sup>m</sup> 0	<sup>°</sup> 11 <sup>'</sup> 11
Jan. 0.6	50.73 +.21	45.9 -1.4	14.02 +.32	61.7 +0.8	50.70 +.51	33.2 +1.7	39.33 +.24	30.8 -1.2
10.6	50.92 .17	44.6 1.2	14.31 .26	62.7 1.2	51.17 .41	35.0 2.1	39.55 .19	29.7 1.0
20.5	51.06 .12	43.5 1.0	14.53 .19	64.0 1.5	51.52 .30	37.3 2.4	39.72 .14	28.8 0.8
30.5	51.16 .07	42.5 0.8	14.68 .11	65.6 1.7	51.77 .18	39.7 2.6	39.84 .09	28.0 0.6
Feb. 9.5	51.20 +.02	41.8 0.6	14.76 +.04	67.4 1.8	51.88 +.06	42.4 2.7	39.90 +.04	27.6 0.4
19.4	51.20 -.02	41.4 0.4	14.77 -.03	69.3 1.9	51.88 -.06	45.1 2.7	39.92 -.01	27.3 -0.2
Mar. 1.4	51.14 .06	41.1 -0.2	14.70 .10	71.1 1.9	51.76 .17	47.7 2.6	39.89 .05	27.3 0.0
11.4	51.06 .10	41.0 0.0	14.58 .15	73.0 1.7	51.53 .27	50.2 2.4	39.82 .09	27.4 +0.2
21.4	50.94 .13	41.0 +0.1	14.40 .20	74.6 1.6	51.21 .35	52.4 2.0	39.72 .12	27.7 0.3
31.3	50.80 .15	41.2 0.3	14.18 .22	76.1 1.3	50.83 .41	54.3 1.7	39.58 .14	28.0 0.4
Apr. 10.3	50.64 .16	41.5 0.4	13.95 .24	77.3 1.0	50.39 .45	55.8 1.2	39.44 .15	28.4 0.5
20.3	50.48 .16	41.9 0.4	13.70 .25	78.2 0.7	49.93 .47	56.8 0.8	39.29 .15	28.9 0.5
30.3	50.33 .15	42.4 0.5	13.45 .24	78.7 +0.4	49.45 .46	57.3 +0.3	39.13 .15	29.5 0.5
May 10.2	50.19 .13	42.9 0.6	13.22 .22	78.9 0.0	49.00 .44	57.3 -0.2	38.99 .14	30.0 0.5
20.2	50.06 .11	43.5 0.6	13.00 .20	78.7 -0.3	48.57 .40	56.8 0.7	38.86 .12	30.6 0.5
30.2	49.96 0.9	44.1 0.6	12.82 .16	78.3 0.6	48.19 .35	55.9 1.1	38.75 .10	31.1 0.5
June 9.1	49.89 0.6	44.8 0.7	12.68 .12	77.5 0.9	47.88 .28	54.6 1.5	38.67 .07	31.6 0.5
19.1	49.84 -0.03	45.5 0.7	12.58 .08	76.4 1.2	47.63 .21	52.8 1.9	38.61 .05	32.1 0.5
29.1	49.82 .00	46.1 0.7	12.52 -0.03	75.1 1.4	47.46 .13	50.8 2.2	38.58 -0.02	32.6 0.4
July 9.1	49.83 +0.03	46.8 0.6	12.52 +0.01	73.6 1.6	47.37 -0.05	48.4 2.4	38.57 +0.01	33.0 0.4
19.0	49.87 .06	47.4 0.6	12.55 .06	71.9 1.8	47.36 +0.04	45.9 2.6	38.60 .04	33.3 0.3
29.0	49.94 .09	48.0 0.5	12.64 .11	70.0 1.9	47.44 .12	43.2 2.8	38.65 .07	33.6 0.2
Aug. 8.0	50.04 .11	48.5 0.4	12.76 .15	68.1 2.0	47.60 .20	40.4 2.8	38.73 .10	33.8 +0.1
18.0	50.17 .14	48.8 0.3	12.93 .19	66.1 2.0	47.84 .28	37.5 2.9	38.84 .12	33.8 0.0
27.9	50.32 .17	49.0 +0.1	13.15 .22	64.0 2.1	48.16 .36	34.7 2.8	38.98 .15	33.7 -0.2
Sept. 6.9	50.50 .20	49.0 -0.1	13.40 .27	62.0 2.0	48.55 .43	31.9 2.7	39.15 .18	33.4 0.4
16.9	50.71 .22	48.8 0.3	13.69 .31	60.0 2.0	49.02 .50	29.2 2.6	39.34 .21	33.0 0.6
26.8	50.94 .24	48.4 0.5	14.03 .35	58.0 1.9	49.55 .56	26.8 2.3	39.56 .23	32.3 0.8
Oct. 6.8	51.20 .27	47.7 0.8	14.39 .38	56.2 1.8	50.14 .62	24.5 2.1	39.81 .26	31.5 1.0
16.8	51.48 .29	46.9 1.0	14.78 .41	54.4 1.6	50.78 .66	22.6 1.8	40.08 .28	30.4 1.2
26.8	51.77 .30	45.7 1.2	15.21 .43	52.9 1.4	51.46 .70	21.0 1.4	40.37 .30	29.1 1.3
Nov. 5.7	52.08 .31	44.4 1.4	15.65 .45	51.7 1.1	52.18 .72	19.8 1.0	40.68 .31	27.7 1.5
15.7	52.39 .31	43.0 1.5	16.10 .45	50.7 0.8	52.91 .73	19.0 0.5	41.00 .32	26.2 1.5
25.7	52.70 .30	41.4 1.6	16.54 .44	50.0 0.5	53.64 .72	18.7 -0.1	41.33 .32	24.7 1.6
Dec. 5.7	53.00 .29	39.8 1.6	16.98 .43	49.7 -0.1	54.35 .69	18.9 +0.4	41.64 .31	23.1 1.5
15.6	53.29 .27	38.2 1.6	17.40 .40	49.7 +0.3	55.02 .64	19.6 0.9	41.94 .29	21.6 1.5
25.6	53.55 .24	36.7 1.5	17.78 .35	50.2 0.6	55.63 .57	20.8 1.4	42.22 .26	20.2 1.3
35.6	53.77 +.20	35.3 -1.3	18.11 +.30	51.0 +1.0	56.16 +.48	22.4 +1.8	42.46 +.22	18.9 -1.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	α Argus.		*1 Draconis.		α Hydræ.		*24 Ursæ Majoris (α).	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> 9 <sup>m</sup> 13	<sup>°</sup> 58 <sup>'</sup> 43	<sup>h</sup> 9 <sup>m</sup> 18	<sup>°</sup> 81 <sup>'</sup> 53	<sup>h</sup> 9 <sup>m</sup> 21	<sup>°</sup> 8 <sup>'</sup> 5	<sup>h</sup> 9 <sup>m</sup> 22	<sup>°</sup> 70 <sup>'</sup> 23
Jan. 0.6	37.26 +.30	23.8 +3.5	13.94+1.32	51.0 +2.0	9.46 +.24	32.4 +2.2	51.76 +.62	58.1 +1.6
10.6	37.52 .22	27.3 3.6	15.14 1.07	53.2 2.4	9.68 .20	34.6 2.1	52.33 .51	59.9 2.0
20.6	37.70 .14	31.0 3.7	16.08 .79	55.8 2.8	9.86 .15	36.6 2.0	52.78 .39	62.1 2.3
30.6	37.80 +.06	34.8 3.7	16.73 .49	58.7 3.0	9.99 .10	38.5 1.8	53.11 .26	64.6 2.6
Feb. 9.5	37.82 -.03	38.4 3.6	17.06 +.17	61.8 3.1	10.06 .05	40.2 1.6	53.30 +.12	67.3 2.8
19.5	37.75 .11	42.0 3.4	17.08 -.14	64.9 3.1	10.09 +.01	41.6 1.3	53.36 -.01	70.1 2.8
Mar. 1.4	37.61 .17	45.3 3.1	16.79 .44	68.0 3.0	10.07 -.04	42.9 1.1	53.28 .14	72.9 2.7
11.4	37.40 .23	48.2 2.8	16.21 .70	70.9 2.7	10.02 .08	43.8 0.8	53.08 .26	75.6 2.6
21.4	37.14 .28	50.8 2.4	15.38 .93	73.5 2.4	9.92 .11	44.5 0.6	52.77 .36	78.0 2.3
31.4	36.83 .32	53.0 2.0	14.34 1.12	75.6 1.9	9.80 .13	44.9 0.3	52.37 .43	80.2 1.9
Apr. 10.3	36.49 .35	54.7 1.5	13.14 1.26	77.3 1.4	9.66 .14	45.1 +0.1	51.89 .49	81.9 1.5
20.3	36.13 .37	56.0 1.0	11.83 1.34	78.5 0.9	9.51 .15	45.1 -0.1	51.38 .52	83.2 1.0
30.3	35.76 .37	56.7 +0.5	10.46 1.36	79.2 +0.3	9.36 .15	44.8 0.3	50.85 .53	84.0 +0.5
May 10.3	35.38 .37	56.9 -0.1	9.10 1.34	79.2 -0.2	9.22 .14	44.4 0.5	50.32 .52	84.3 0.0
20.2	35.02 .35	56.6 0.6	7.79 1.26	78.7 0.8	9.08 .13	43.7 0.7	49.81 .49	84.0 -0.5
30.2	34.68 .33	55.8 1.1	6.57 1.15	77.6 1.3	8.96 .11	42.9 0.9	49.35 .44	83.3 1.0
June 9.2	34.37 .30	54.5 1.5	5.49 1.00	76.1 1.8	8.86 .09	42.0 1.0	48.94 .37	82.1 1.4
19.1	34.09 .26	52.7 2.0	4.57 .82	74.1 2.2	8.78 .07	40.9 1.1	48.60 .30	80.5 1.8
29.1	33.85 .21	50.6 2.3	3.85 .62	71.7 2.6	8.73 .04	39.7 1.2	48.34 .22	78.5 2.2
July 9.1	33.67 .16	48.1 2.6	3.34 .40	69.0 2.9	8.70 -.02	38.5 1.3	48.16 .13	76.2 2.5
19.1	33.53 .10	45.3 2.9	3.05 -.17	66.0 3.1	8.69 +.01	37.2 1.3	48.08 -.04	73.6 2.7
29.0	33.46 -.04	42.4 3.0	2.99 +.06	62.8 3.2	8.71 .04	35.9 1.3	48.08 +.05	70.8 2.9
Aug. 8.0	33.45 +.02	39.3 3.1	3.16 .29	59.5 3.3	8.76 .07	34.7 1.2	48.18 .15	67.8 3.0
18.0	33.50 .09	36.2 3.0	3.57 .52	56.2 3.3	8.84 .09	33.6 1.0	48.38 .24	64.8 3.0
28.0	33.62 .16	33.2 2.9	4.19 .74	52.8 3.3	8.95 .12	32.6 0.9	48.66 .33	61.8 3.0
Sept. 6.9	33.81 .22	30.4 2.6	5.04 .95	49.6 3.2	9.09 .15	31.9 0.6	49.03 .41	58.7 3.0
16.9	34.06 .28	28.0 2.2	6.09 1.15	46.5 3.0	9.26 .18	31.4 -0.3	49.49 .50	55.8 2.9
26.9	34.38 .34	26.0 1.8	7.33 1.33	43.7 2.7	9.45 .21	31.3 0.0	50.03 .57	53.0 2.7
Oct. 6.8	34.75 .40	24.4 1.3	8.74 1.49	41.1 2.4	9.68 .24	31.4 +0.3	50.64 .64	50.5 2.4
16.8	35.17 .44	23.4 -0.7	10.30 1.62	38.9 2.0	9.94 .27	31.9 0.7	51.31 .71	48.2 2.1
26.8	35.62 .47	23.1 0.0	11.99 1.73	37.1 1.6	10.21 .29	32.8 1.1	52.05 .76	46.3 1.7
Nov. 5.8	36.11 .49	23.4 +0.6	13.76 1.80	35.8 1.1	10.51 .30	34.0 1.4	52.83 .79	44.8 1.3
15.7	36.60 .49	24.4 1.3	15.58 1.82	35.0 -0.5	10.82 .31	35.6 1.7	53.63 .81	43.7 0.8
25.7	37.08 .47	25.9 1.9	17.40 1.81	34.7 0.0	11.14 .31	37.4 1.9	54.45 .81	43.1 -0.3
Dec. 5.7	37.55 .44	28.1 2.4	19.19 1.74	35.0 +0.6	11.45 .31	39.4 2.1	55.26 .79	43.0 +0.2
15.7	37.97 .40	30.8 2.9	20.88 1.62	35.9 1.2	11.75 .29	41.5 2.2	56.03 .75	43.5 0.7
25.6	38.35 .34	33.9 3.3	22.43 1.46	37.3 1.7	12.03 .26	43.7 2.2	56.75 .68	44.5 1.2
35.6	38.65 +.27	37.3 +3.5	23.70+1.24	39.2 +2.1	12.27 +.22	45.9 +2.2	57.39 +.50	45.9 +1.7

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\theta$ Ursæ Majoris.		$\epsilon$ Leonis.		$\mu$ Leonis.		$\alpha$ Leonis. (Regulus.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 9 <sup>m</sup> 24	<sup>°</sup> 52 <sup>'</sup> 15	<sup>h</sup> 9 <sup>m</sup> 38	<sup>°</sup> 24 <sup>'</sup> 22	<sup>h</sup> 9 <sup>m</sup> 45	<sup>°</sup> 26 <sup>'</sup> 36	<sup>h</sup> 10 <sup>m</sup> 1	<sup>°</sup> 12 <sup>'</sup> 36
Jan. 0.6	<sup>s</sup> 5.06 +.38	<sup>"</sup> 67.9 +0.7	<sup>s</sup> 24.84 +.28	<sup>"</sup> 25.4 -0.8	<sup>s</sup> 18.56 +.30	<sup>"</sup> 72.7 -0.7	<sup>s</sup> 23.72 +.28	<sup>"</sup> 18.4 -1.4
10.6	5.40 .31	68.8 1.1	25.10 .24	24.8 0.5	18.84 .25	72.2 0.4	23.99 .24	17.1 1.2
20.6	5.68 .25	70.1 1.5	25.32 .20	24.5 -0.2	19.07 .20	72.0 -0.1	24.21 .20	16.0 0.9
30.5	5.89 .17	71.8 1.8	25.49 .14	24.5 +0.1	19.25 .15	72.1 +0.2	24.39 .15	15.2 0.7
Feb. 9.5	6.02 .09	73.7 2.0	25.61 .09	24.7 0.4	19.37 .10	72.5 0.5	24.52 .10	14.7 0.4
19.5	6.08 +.01	75.7 2.1	25.67 +.03	25.2 0.6	19.44 +.04	73.1 0.7	24.60 .05	14.4 -0.1
Mar. 1.4	6.05 -.06	77.8 2.1	25.68 -.02	25.9 0.8	19.46 -.01	73.9 0.9	24.63 +.01	14.4 +0.1
11.4	5.96 .12	80.0 2.0	25.64 .06	26.8 0.9	19.42 .05	74.9 1.0	24.62 -.03	14.6 0.3
21.4	5.81 .18	81.9 1.9	25.56 .10	27.7 1.0	19.35 .09	76.0 1.1	24.56 .07	14.9 0.4
31.4	5.60 .22	83.7 1.7	25.45 .12	28.7 1.0	19.24 .12	77.0 1.1	24.47 .10	15.4 0.5
Apr. 10.3	5.36 .35	85.3 1.4	25.31 .14	29.6 0.9	19.11 .14	78.1 1.0	24.36 .12	16.0 0.6
20.3	5.11 .26	86.5 1.0	25.16 .15	30.5 0.9	18.95 .15	79.1 0.9	24.24 .13	16.7 0.7
30.3	4.84 .26	87.4 0.7	25.01 .15	31.3 0.8	18.80 .16	80.0 0.8	24.10 .14	17.3 0.7
May 10.3	4.58 .26	87.8 +0.3	24.85 .15	32.0 0.8	18.64 .15	80.7 0.6	23.97 .13	18.0 0.7
20.2	4.33 .23	87.9 -0.1	24.71 .14	32.6 0.5	18.49 .14	81.2 0.5	23.84 .13	18.7 0.6
30.2	4.11 .21	87.6 0.5	24.58 .12	33.0 0.3	18.36 .13	81.6 0.3	23.71 .12	19.3 0.6
June 9.2	3.92 .17	87.0 0.8	24.47 .10	33.2 +0.2	18.24 .10	81.8 +0.1	23.61 .10	19.8 0.5
19.1	3.77 .13	86.0 1.2	24.38 .08	33.3 0.0	18.15 .08	81.9 -0.1	23.52 .08	20.3 0.5
29.1	3.66 .09	84.7 1.5	24.32 .05	33.2 -0.1	18.08 .06	81.7 0.2	23.45 .06	20.7 0.4
July 9.1	3.59 -.04	83.1 1.7	24.29 -.02	33.0 0.3	18.04 -.03	81.4 0.4	23.40 .04	21.0 0.3
19.1	3.58 +.01	81.2 1.9	24.28 +.01	32.6 0.4	18.02 .00	80.9 0.6	23.37 -.01	21.3 +0.2
29.0	3.61 .05	79.2 2.1	24.30 .04	32.1 0.6	18.04 +.03	80.3 0.7	23.37 +.01	21.4 0.0
Aug. 8.0	3.69 .10	77.0 2.3	24.35 .07	31.4 0.7	18.08 .06	79.5 0.9	23.39 .04	21.4 -0.1
18.0	3.81 .15	74.7 2.4	24.43 .10	30.6 0.9	18.15 .09	78.5 1.1	23.44 .07	21.2 0.2
28.0	3.98 .20	72.3 2.4	24.54 .13	29.6 1.1	18.26 .12	77.4 1.2	23.52 .09	20.9 0.4
Sept. 6.9	4.20 .24	69.9 2.4	24.69 .16	28.5 1.2	18.40 .15	76.1 1.3	23.63 .12	20.4 0.6
16.9	4.47 .29	67.4 2.4	24.86 .19	27.2 1.3	18.56 .19	74.7 1.5	23.77 .16	19.7 0.8
26.9	4.78 .33	65.1 2.3	25.07 .22	25.8 1.5	18.77 .22	73.2 1.6	23.94 .19	18.7 1.0
Oct. 6.8	5.13 .37	62.8 2.2	25.30 .25	24.3 1.6	19.00 .25	71.5 1.7	24.15 .22	17.6 1.2
16.8	5.52 .41	60.6 2.0	25.57 .28	22.7 1.7	19.27 .28	69.8 1.7	24.38 .25	16.3 1.4
26.8	5.94 .44	58.7 1.8	25.87 .31	21.0 1.7	19.56 .31	68.0 1.8	24.64 .28	14.8 1.6
Nov. 5.8	6.40 .46	57.0 1.5	26.18 .33	19.3 1.7	19.88 .33	66.2 1.8	24.94 .30	13.1 1.7
15.7	6.87 .48	55.6 1.2	26.52 .34	17.6 1.7	20.23 .35	64.5 1.7	25.25 .32	11.4 1.8
25.7	7.35 .48	54.6 0.8	26.87 .35	16.0 1.5	20.58 .36	62.8 1.6	25.57 .33	9.6 1.8
Dec. 5.7	7.83 .47	54.0 -0.4	27.22 .35	14.5 1.4	20.94 .35	61.3 1.4	25.91 .33	7.8 1.8
15.7	8.30 .45	53.8 0.0	27.56 .33	13.2 1.2	21.29 .34	60.1 1.1	26.23 .32	6.0 1.7
25.6	8.73 .41	54.0 +0.5	27.88 .31	12.1 0.9	21.62 .31	59.0 0.9	26.55 .30	4.4 1.5
35.6	9.11 +.36	54.7 +0.9	28.18 +.27	11.3 +0.7	21.91 +.28	58.3 -0.6	26.83 +.27	2.9 -1.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	*32 Ursæ Majoris.		γ <sup>1</sup> Leonis.		*9 Draconis (H).		ρ Leonis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 10	<sup>m</sup> 8	<sup>h</sup> 10	<sup>m</sup> 12	<sup>h</sup> 10	<sup>m</sup> 23	<sup>h</sup> 10	<sup>m</sup> 25
Jan. 0.6	29.46 +.58	21.7 +0.9	44.79 +.30	64.0 -1.1	53.38 +.97	54.3 +1.0	54.75 +.39	43.1 -1.6
10.6	30.01 .51	22.8 1.3	45.08 .36	63.0 0.8	54.30 .86	55.6 1.6	55.03 .36	41.6 1.4
20.6	30.48 .42	24.4 1.8	45.32 .32	62.3 0.5	55.11 .73	57.5 2.1	55.27 .32	40.3 1.2
30.6	30.86 .32	26.4 2.2	45.52 .17	61.0 -0.2	55.76 .57	59.7 2.5	55.47 .18	39.3 0.9
Feb. 9.5	31.13 .22	28.7 2.5	45.67 .12	61.8 +0.1	56.24 .39	62.4 2.8	55.62 .13	38.5 0.6
19.5	31.29 +.11	31.3 2.7	45.77 .07	62.0 0.3	56.54 .30	65.2 3.0	55.72 .08	38.0 0.3
Mar. 1.5	31.34 -.01	34.0 2.7	45.81 +.02	62.5 0.5	56.65 +.02	68.3 3.0	55.78 +.03	37.8 -0.1
11.4	31.28 .11	36.8 2.7	45.81 -.02	63.1 0.7	56.58 -.16	71.3 3.0	55.79 -.01	37.8 +0.1
21.4	31.13 .20	39.4 2.5	45.77 .06	63.9 0.8	56.33 .32	74.2 2.8	55.76 .05	38.1 0.3
31.4	30.89 .27	41.8 2.3	45.69 .09	64.8 0.9	55.93 .47	76.9 2.5	55.70 .08	38.4 0.5
Apr. 10.4	30.58 .34	44.0 2.0	45.58 .12	65.7 0.9	55.39 .59	79.3 2.2	55.61 .10	39.0 0.6
20.3	30.22 .38	45.8 1.6	45.45 .13	66.7 0.9	54.75 .68	81.2 1.7	55.50 .12	39.6 0.6
30.3	29.82 .40	47.1 1.1	45.32 .14	67.5 0.8	54.04 .73	82.7 1.2	55.38 .12	40.2 0.7
May 10.3	29.41 .41	48.0 0.6	45.18 .14	68.3 0.8	53.28 .76	83.7 0.7	55.25 .13	40.9 0.7
20.3	29.00 .40	48.4 +0.2	45.04 .13	69.0 0.6	52.51 .76	84.1 +0.2	55.12 .12	41.6 0.7
30.2	28.61 .38	48.3 -0.3	44.91 .12	69.6 0.5	51.76 .74	84.0 -0.4	55.00 .12	42.2 0.6
June 9.2	28.25 .34	47.7 0.8	44.80 .11	70.1 0.4	51.04 .69	83.3 0.9	54.89 .10	42.9 0.6
19.2	27.93 .30	46.7 1.3	44.70 .09	70.4 0.2	50.38 .62	82.2 1.4	54.80 .09	43.4 0.5
29.1	27.65 .24	45.2 1.7	44.62 .07	70.5 +0.1	49.79 .54	80.5 1.9	54.71 .07	43.9 0.5
July 9.1	27.44 .18	43.3 2.0	44.56 .05	70.5 -0.1	49.30 .44	78.4 2.3	54.65 .05	44.4 0.4
19.1	27.29 .12	41.1 2.3	44.53 -.02	70.4 0.2	48.92 .39	75.9 2.6	54.61 .03	44.7 0.3
29.1	27.20 -.05	38.6 2.6	44.52 .00	70.0 0.4	48.65 .31	73.1 2.9	54.58 -.01	44.9 +0.2
Aug. 8.0	27.18 +.02	35.9 2.8	44.53 +.03	69.6 0.6	48.51 -.08	70.1 3.2	54.58 +.01	45.0 0.6
18.0	27.24 .09	33.0 3.0	44.57 .06	68.9 0.7	48.49 +.05	66.8 3.3	54.61 .04	45.0 -0.1
28.0	27.36 .16	29.9 3.1	44.65 .09	68.1 0.9	48.60 .18	63.4 3.4	54.66 .07	44.8 0.3
Sept. 7.0	27.56 .24	26.8 3.1	44.75 .12	67.1 1.1	48.84 .31	60.0 3.5	54.74 .10	44.4 0.5
16.9	27.84 .31	23.6 3.1	44.89 .15	65.9 1.3	49.22 .44	56.5 3.4	54.86 .12	43.8 0.7
26.9	28.18 .38	20.6 3.0	45.05 .19	64.6 1.4	49.72 .57	53.1 3.3	55.00 .17	42.9 0.9
Oct. 6.9	28.60 .45	17.6 2.9	45.25 .22	63.0 1.6	50.35 .69	49.9 3.1	55.19 .20	41.9 1.2
16.8	29.08 .51	14.8 2.6	45.49 .25	61.4 1.7	51.10 .80	46.9 2.9	55.40 .22	40.6 1.4
26.8	29.63 .57	12.3 2.4	45.76 .28	59.6 1.8	51.96 .90	44.2 2.5	55.65 .26	39.1 1.6
Nov. 5.8	30.22 .62	10.1 2.0	46.06 .31	57.7 1.9	52.91 .99	41.8 2.1	55.93 .29	37.4 1.8
15.8	30.86 .65	8.3 1.6	46.38 .33	55.8 1.9	53.94 1.05	40.0 1.6	56.23 .31	35.6 1.9
25.7	31.53 .67	6.9 1.1	46.72 .34	53.9 1.8	55.02 1.09	38.6 1.1	56.55 .33	33.7 1.9
Dec. 5.7	32.21 .68	6.1 0.6	47.06 .34	52.2 1.7	56.12 1.11	37.7 -0.6	56.88 .32	31.8 1.9
15.7	32.88 .66	5.7 -0.1	47.40 .34	50.5 1.5	57.23 1.09	37.5 0.0	57.21 .32	29.9 1.9
25.7	33.53 .62	5.9 +0.5	47.73 .32	49.1 1.3	58.30 1.03	37.8 +0.8	57.53 .31	28.1 1.7
35.6	34.12 +.57	6.7 +1.0	48.04 +.29	47.9 -1.0	59.29 +0.25	38.7 +1.2	57.83 +.29	26.4 -1.5



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\eta$ Argus.		$\iota$ Leonis.		$\alpha$ Ursæ Majoris.		$\delta$ Leonis.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 10 39	<sup>m</sup> 58° 59'	<sup>h</sup> 10 42	<sup>m</sup> 11° 13'	<sup>h</sup> 10 55	<sup>m</sup> 62° 26'	<sup>h</sup> 11 7	<sup>m</sup> 21° 14'
Jan. 0.7	60.65 +.43	28.1 +2.9	22.04 +.30	71.7 -1.6	36.83 +.57	71.8 +0.1	8.05 +.33	21.6 -1.4
10.6	61.05 .37	31.2 3.9	22.32 .27	70.2 1.4	37.38 .52	72.2 0.7	8.36 .31	20.3 1.2
20.6	61.40 .30	34.5 3.4	22.58 .23	68.9 1.2	37.87 .45	73.1 1.2	8.66 .27	19.4 0.8
30.6	61.66 .23	38.1 3.6	22.79 .19	67.9 0.9	38.28 .38	74.6 1.7	8.89 .22	18.8 0.4
Feb. 9.6	61.85 .15	41.7 3.7	22.96 .14	67.2 0.6	38.62 .29	76.5 2.1	9.09 .18	18.5 -0.1
19.5	61.97 +.07	45.4 3.6	23.08 .10	66.7 -0.3	38.86 .20	78.8 2.4	9.25 .13	18.6 +0.3
Mar. 1.5	62.00 .00	49.0 3.5	23.15 .05	66.6 0.0	39.01 +.10	81.3 2.6	9.35 .08	19.0 0.5
11.5	61.97 -0.07	52.4 3.3	23.18 +.01	66.7 +0.2	39.06 .00	84.0 2.7	9.40 +.03	19.7 0.8
21.5	61.86 .13	55.7 3.1	23.17 -.03	67.0 0.4	39.01 -.09	86.7 2.7	9.42 -.01	20.6 0.9
31.4	61.70 .19	58.6 2.8	23.12 .06	67.4 0.5	38.89 .16	89.4 2.6	9.39 .04	21.6 1.1
Apr. 10.4	61.49 .24	61.2 2.4	23.04 .09	68.0 0.6	38.69 .23	91.8 2.3	9.33 .07	22.7 1.1
20.4	61.23 .27	63.4 2.0	22.94 .11	68.7 0.7	38.44 .28	94.0 2.0	9.24 .10	23.9 1.1
30.3	60.94 .30	65.1 1.5	22.83 .12	69.4 0.7	38.14 .31	95.9 1.6	9.13 .11	25.0 1.1
May 10.3	60.63 .32	66.4 1.0	22.71 .12	70.2 0.7	37.81 .34	97.3 1.2	9.01 .12	26.1 1.0
20.3	60.31 .33	67.2 +0.6	22.58 .12	70.9 0.7	37.47 .34	98.3 0.8	8.89 .13	27.0 0.9
30.3	59.98 .33	67.5 0.0	22.46 .12	71.6 0.7	37.12 .34	98.8 +0.3	8.76 .12	27.8 0.7
June 9.2	59.65 .32	67.3 -0.4	22.35 .11	72.2 0.6	36.79 .33	98.8 -0.2	8.64 .12	28.5 0.6
19.2	59.33 .31	66.6 0.9	22.25 .10	72.8 0.5	36.47 .30	98.4 0.7	8.53 .11	29.0 0.4
29.2	59.03 .29	65.4 1.4	22.16 .08	73.3 0.4	36.18 .27	97.4 1.2	8.42 .10	29.2 +0.2
July 9.2	58.75 .26	63.8 1.8	22.09 .06	73.7 0.3	35.93 .23	96.1 1.6	8.33 .08	29.4 0.0
19.1	58.51 .22	61.8 2.2	22.03 .05	73.9 0.2	35.72 .18	94.3 2.0	8.25 .07	29.3 -0.2
29.1	58.31 .18	59.5 2.5	22.00 -.03	74.1 +0.1	35.57 .13	92.1 2.3	8.19 .05	29.0 0.4
Aug. 8.1	58.16 .12	56.8 2.7	21.98 .00	74.1 -0.1	35.46 .08	89.7 2.6	8.16 -.03	28.5 0.6
18.0	58.06 -.06	54.0 2.9	21.99 +.02	74.0 0.2	35.41 -.02	87.0 2.8	8.14 .00	27.8 0.8
28.0	58.03 .00	51.1 2.9	22.03 .05	73.7 0.4	35.42 +.04	84.0 3.0	8.16 +.03	26.9 1.0
Sept. 7.0	58.07 +.07	48.3 2.8	22.10 .08	73.2 0.6	35.50 .11	80.9 3.2	8.20 .06	25.7 1.2
17.0	58.18 .15	45.5 2.6	22.19 .11	72.5 0.8	35.64 .18	77.7 3.3	8.28 .09	24.4 1.4
26.9	58.36 .22	43.0 2.4	22.32 .15	71.5 1.0	35.85 .24	74.4 3.3	8.39 .13	22.8 1.6
Oct. 6.9	58.62 .29	40.8 2.0	22.49 .19	70.4 1.3	36.12 .31	71.1 3.2	8.54 .17	21.1 1.8
16.9	58.94 .36	39.0 1.5	22.69 .22	69.0 1.5	36.47 .38	68.0 3.1	8.73 .21	19.2 2.0
26.9	59.33 .42	37.8 1.0	22.93 .25	67.4 1.7	36.88 .44	65.0 2.9	8.95 .25	17.2 2.1
Nov. 5.8	59.77 .46	37.1 -0.4	23.20 .28	65.7 1.8	37.36 .50	62.2 2.6	9.22 .28	15.0 2.2
15.8	60.25 .49	37.1 +0.3	23.50 .31	63.8 1.9	37.88 .55	59.8 2.2	9.51 .31	12.9 2.2
25.8	60.76 .51	37.7 0.9	23.82 .32	61.8 2.0	38.45 .58	57.7 1.8	9.84 .33	10.7 2.1
Dec. 5.7	61.27 .51	38.9 1.5	24.15 .33	59.9 2.0	39.04 .00	56.1 1.3	10.18 .34	8.6 2.0
15.7	61.78 .49	40.7 2.1	24.48 .33	57.9 1.9	39.65 .61	55.0 0.8	10.52 .35	6.6 1.9
25.7	62.26 .46	43.0 2.6	24.80 .32	56.1 1.8	40.26 .59	54.5 -0.2	10.87 .34	4.9 1.6
35.7	62.70 +.41	45.8 +3.0	25.11 +.29	54.4 -1.6	40.83 +.56	54.5 +0.3	11.20 +.32	3.4 -1.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\delta$ Crateris.		$\tau$ Leonis.		* $\lambda$ Draconis.		91 Leonis ( $\nu$ ).	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 11 <sup>m</sup> 12	<sup>°</sup> 14 <sup>'</sup> 4	<sup>h</sup> 11 <sup>m</sup> 21	<sup>°</sup> 3 34	<sup>h</sup> 11 <sup>m</sup> 23	<sup>°</sup> 70 <sup>'</sup> 2	<sup>h</sup> 11 <sup>m</sup> 30	<sup>°</sup> 0 <sup>'</sup> 6
Jan. 0.7	47.58 +.31	6.9 +2.3	11.79 +.31	38.9 -2.0	34.88 +.76	56.7 0.0	14.28 +.32	0.9 +2.1
10.7	47.87 .28	9.3 2.3	12.09 .29	37.0 1.8	35.62 .71	57.0 +0.6	14.58 .29	2.9 2.0
20.6	48.14 .25	11.6 2.3	12.36 .26	35.2 1.6	36.30 .64	57.9 1.2	14.86 .26	4.8 1.8
30.6	48.37 .21	13.9 2.2	12.60 .22	33.7 1.4	36.89 .54	59.4 1.7	15.10 .22	6.4 1.6
Feb. 9.6	48.55 .16	16.0 2.0	12.80 .18	32.5 1.1	37.38 .43	61.4 2.2	15.31 .18	7.9 1.3
19.6	48.70 .12	17.9 1.8	12.95 .13	31.5 0.8	37.76 .32	63.8 2.5	15.47 .14	9.1 1.1
Mar. 1.5	48.79 .07	19.6 1.6	13.06 .09	30.8 0.6	38.02 .19	66.5 2.8	15.58 .10	10.0 0.8
11.5	48.84 +.03	21.1 1.4	13.13 .05	30.4 0.3	38.14 +.07	69.4 2.9	15.66 .05	10.7 0.5
21.5	48.85 -.01	22.4 1.1	13.15 +.01	30.2 -0.1	38.15 -.06	72.3 2.9	15.69 +.01	11.1 0.3
31.5	48.83 .04	23.3 0.9	13.14 -.03	30.2 +0.1	38.03 .17	75.3 2.8	15.69 -.02	11.3 +0.1
Apr. 10.4	48.78 .07	24.1 0.6	13.10 .06	30.5 0.3	37.81 .27	78.0 2.6	15.65 .05	11.2 -0.1
20.4	48.70 .09	24.5 0.4	13.03 .08	30.8 0.4	37.50 .35	80.5 2.3	15.59 .07	11.0 0.3
30.4	48.60 .10	24.8 +0.1	12.94 .09	31.3 0.5	37.12 .41	82.6 1.9	15.51 .09	10.7 0.4
May 10.3	48.49 .11	24.8 -0.1	12.84 .10	31.9 0.6	36.68 .46	84.3 1.5	15.42 .10	10.2 0.5
20.3	48.38 .12	24.6 0.3	12.74 .11	32.6 0.7	36.20 .49	85.6 1.0	15.32 .10	9.7 0.6
30.3	48.26 .12	24.2 0.5	12.63 .11	33.2 0.7	35.71 .50	86.3 +0.5	15.21 .11	9.1 0.6
June 9.3	48.14 .12	23.7 0.6	12.52 .11	33.9 0.7	35.21 .49	86.5 -0.1	15.11 .11	8.4 0.7
19.2	48.03 .11	23.0 0.8	12.41 .10	34.6 0.7	34.73 .47	86.2 0.6	15.00 .10	7.7 0.7
29.2	47.92 .10	22.1 1.0	12.31 .10	35.3 0.6	34.27 .44	85.4 1.1	14.90 .10	7.0 0.7
July 9.2	47.82 .09	21.1 1.1	12.22 .09	35.9 0.6	33.86 .39	84.1 1.6	14.80 .09	6.3 0.7
19.2	47.73 .08	20.0 1.1	12.14 .07	36.5 0.5	33.49 .34	82.3 2.0	14.72 .08	5.6 0.6
29.1	47.66 .06	18.8 1.2	12.08 .06	36.9 0.4	33.18 .28	80.1 2.4	14.64 .06	5.0 0.6
Aug. 8.1	47.61 .04	17.6 1.2	12.03 .04	37.3 0.3	32.94 .21	77.5 2.7	14.59 .04	4.5 0.5
18.1	47.58 -.02	16.5 1.1	12.00 -.01	37.6 +0.2	32.77 .13	74.6 3.0	14.56 -.02	4.1 0.4
28.0	47.57 +.01	15.4 1.0	12.00 +.01	37.7 0.0	32.68 -.05	71.5 3.3	14.54 .00	3.8 -0.2
Sept. 7.0	47.60 .04	14.4 0.9	12.03 .04	37.6 -0.2	32.68 +.04	68.1 3.4	14.56 +.03	3.6 0.0
17.0	47.66 .08	13.7 0.6	12.08 .07	37.3 0.4	32.76 .13	64.6 3.5	14.60 .06	3.7 +0.2
27.0	47.76 .12	13.1 0.4	12.17 .11	36.8 0.7	32.94 .23	61.1 3.6	14.68 .10	4.0 0.5
Oct. 6.9	47.90 .16	12.9 -0.1	12.30 .15	36.0 0.9	33.22 .32	57.5 3.5	14.80 .14	4.6 0.7
16.9	48.07 .20	13.0 +0.3	12.47 .19	34.9 1.2	33.59 .42	54.0 3.4	14.96 .18	5.4 1.0
26.9	48.29 .23	13.4 0.6	12.67 .22	33.6 1.4	34.05 .51	50.7 3.2	15.16 .22	6.6 1.3
Nov. 5.8	48.54 .27	14.2 1.0	12.91 .26	32.1 1.7	34.60 .59	47.7 2.9	15.39 .25	8.0 1.5
15.8	48.82 .30	15.4 1.4	13.19 .29	30.3 1.8	35.23 .66	45.0 2.5	15.66 .28	9.6 1.7
25.8	49.13 .32	16.9 1.7	13.49 .31	28.4 2.0	35.93 .72	42.6 2.1	15.96 .31	11.4 1.9
Dec. 5.8	49.46 .33	18.7 1.9	13.80 .32	26.4 2.1	36.67 .76	40.8 1.6	16.27 .32	13.4 2.0
15.7	49.79 .33	20.8 2.1	14.13 .33	24.3 2.1	37.45 .78	39.5 1.0	16.60 .33	15.5 2.1
25.7	50.12 .32	23.0 2.3	14.46 .32	22.2 2.0	38.23 .77	38.8 -0.4	16.93 .32	17.6 2.1
35.7	50.43 +.30	25.3 +2.3	14.78 +.31	20.2 -1.9	39.00 +.75	38.7 +0.2	17.24 +.31	19.7 +2.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Leonis.		$\gamma$ Ursæ Majoris.		$\alpha$ Virginis.		*4 Draconis (H).	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 11 <sup>m</sup> 42	<sup>°</sup> 15 <sup>'</sup> 17	<sup>h</sup> 11 <sup>m</sup> 46	<sup>°</sup> 54 <sup>'</sup> 24	<sup>h</sup> 11 <sup>m</sup> 58	<sup>°</sup> 9 <sup>'</sup> 27	<sup>h</sup> 12 <sup>m</sup> 5	<sup>°</sup> 78 <sup>'</sup> 20
Jan. 0.7	22.12 +.33	73.0 -1.8	54.88 +.49	69.9 -0.8	31.71 +.33	37.2 -2.0	59.91+1.22	22.5 -0.4
10.7	22.44 .31	71.4 1.5	55.35 .46	69.4 -0.9	32.03 .31	35.3 1.7	61.12 1.18	22.5 +0.3
20.7	22.74 .28	70.0 1.2	55.80 .43	69.5 +0.4	32.33 .28	33.7 1.5	62.27 1.10	23.1 0.9
30.6	23.00 .24	69.0 0.9	56.20 .37	70.1 0.9	32.59 .25	32.3 1.2	63.33 .99	24.3 1.6
Feb. 9.6	23.22 .20	68.3 0.5	56.55 .31	71.3 1.4	32.82 .21	31.3 0.9	64.25 .84	26.1 2.0
19.6	23.40 .16	67.9 -0.2	56.83 .24	73.0 1.8	33.01 .17	30.6 0.6	65.02 .67	28.4 2.5
Mar. 1.6	23.54 .11	67.9 +0.1	57.03 .17	75.0 2.2	33.16 .13	30.2 -0.2	65.59 .48	31.1 2.8
11.5	23.63 .07	68.2 0.4	57.17 .10	77.3 2.4	33.27 .08	30.1 0.0	65.97 .27	34.0 3.0
21.5	23.67 +.03	68.7 0.6	57.23 +.03	79.8 2.5	33.33 .04	30.2 +0.3	66.14 +.07	37.1 3.1
31.5	23.68 -0.1	69.4 0.8	57.22 -0.4	82.4 2.6	33.35 +.01	30.6 0.5	66.10 -1.13	40.3 3.1
Apr. 10.4	23.65 .04	70.3 0.9	57.15 .10	84.9 2.5	33.34 -0.02	31.2 0.7	65.87 .32	43.3 2.9
20.4	23.60 .07	71.3 1.0	57.02 .15	87.3 2.3	33.31 .05	31.9 0.8	65.46 .48	46.1 2.7
30.4	23.52 .09	72.3 1.0	56.85 .19	89.5 2.1	33.25 .07	32.8 0.8	64.90 .62	48.6 2.3
May 10.4	23.43 .10	73.3 1.0	56.64 .22	91.5 1.7	33.17 .09	33.6 0.9	64.22 .74	50.7 1.9
20.3	23.32 .11	74.3 0.9	56.41 .24	93.0 1.4	33.08 .10	34.5 0.8	63.43 .82	52.4 1.4
30.3	23.21 .11	75.2 0.9	56.17 .25	94.2 0.9	32.98 .10	35.3 0.8	62.57 .88	53.5 0.9
June 9.3	23.20 .11	76.0 0.7	55.92 .25	94.9 0.5	32.87 .11	36.1 0.8	61.68 .91	54.1 +0.3
19.3	22.98 .11	76.7 0.6	55.67 .24	95.2 +0.1	32.76 .11	36.8 0.7	60.76 .91	54.2 -0.2
29.2	22.87 .11	77.2 0.5	55.43 .23	95.0 -0.4	32.66 .11	37.5 0.6	59.86 .88	53.6 0.8
July 9.2	22.77 .10	77.6 0.3	55.21 .22	94.3 0.8	32.55 .10	38.0 0.5	58.99 .84	52.6 1.3
19.2	22.68 .09	77.8 +0.1	55.00 .19	93.3 1.3	32.46 .09	38.4 0.3	58.19 .77	51.0 1.8
29.1	22.60 .07	77.8 -0.1	54.83 .16	91.8 1.7	32.37 .08	38.6 +0.2	57.46 .68	49.0 2.3
Aug. 8.1	22.53 .06	77.6 0.3	54.68 .13	90.0 2.0	32.29 .07	38.8 0.0	56.82 .58	46.5 2.7
18.1	22.49 .03	77.3 0.5	54.57 .09	87.8 2.4	32.24 .05	38.7 -0.2	56.30 .46	43.7 3.0
28.1	22.46 -0.1	76.7 0.7	54.50 -0.5	85.3 2.7	32.20 -0.02	38.4 0.3	55.90 .33	40.5 3.3
Sept. 7.0	22.47 +.02	75.9 0.9	54.47 .00	82.5 2.9	32.19 .00	38.0 0.6	55.63 .20	37.1 3.5
17.0	22.50 .05	74.9 1.1	54.50 +.05	79.5 3.1	32.20 +.04	37.3 0.8	55.51 -0.04	33.4 3.7
27.0	22.57 .09	73.6 1.4	54.58 .11	76.3 3.2	32.26 .07	36.4 1.0	55.55 +.12	29.7 3.8
Oct. 7.0	22.68 .13	72.2 1.6	54.72 .17	73.1 3.3	32.35 .11	35.3 1.3	55.75 .28	25.9 3.8
16.9	22.83 .17	70.5 1.8	54.92 .23	69.8 3.3	32.48 .15	33.9 1.5	56.11 .45	22.1 3.7
26.9	23.02 .21	68.6 2.0	55.19 .29	66.5 3.2	32.65 .19	32.3 1.7	56.64 .61	18.5 3.5
Nov. 5.9	23.25 .25	66.6 2.1	55.51 .35	63.3 3.1	32.87 .23	30.5 1.9	57.33 .77	15.1 3.3
15.8	23.51 .28	64.4 2.2	55.88 .40	60.4 2.8	33.12 .27	28.5 2.1	58.17 .91	12.0 2.9
25.8	23.81 .31	62.2 2.2	56.31 .44	57.7 2.5	33.40 .30	26.3 2.2	59.15 1.03	9.3 2.5
Dec. 5.8	24.13 .33	59.9 2.2	56.77 .48	55.3 2.1	33.71 .32	24.2 2.2	60.24 1.13	7.0 2.0
15.8	24.46 .34	57.8 2.1	57.26 .49	53.4 1.7	34.04 .33	22.0 2.2	61.41 1.20	5.3 1.4
25.7	24.80 .34	55.7 1.9	57.76 .50	52.0 1.1	34.37 .33	19.8 2.1	62.63 1.23	4.2 0.8
35.7	25.13 +.33	53.9 -1.7	58.25 +.49	51.2 -0.6	34.70 +.32	17.8 -1.9	63.87+1.22	3.7 -0.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	* $\beta$ Chamæleontis.		$\eta$ Virginis.		$\alpha^1$ Crucis.		$\beta$ Corvi.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 12 <sup>m</sup> 10	<sup>°</sup> 78 <sup>'</sup> 34	<sup>h</sup> 12 <sup>m</sup> 13	<sup>°</sup> 0 <sup>'</sup> 3	<sup>h</sup> 12 <sup>m</sup> 19	<sup>°</sup> 62 <sup>'</sup> 21	<sup>h</sup> 12 <sup>m</sup> 27	<sup>°</sup> 22 <sup>'</sup> 40
Jan. 0.7	45.23+1.17	41.7 +1.5	11.77 +.38	44.3 -2.1	19.95 +.57	56.0 +1.7	30.12 +.34	8.2 +2.1
10.7	46.38 1.10	43.5 2.1	12.09 .31	42.2 2.0	20.50 .54	58.0 2.2	30.46 .33	10.4 2.3
20.7	47.43 1.00	45.8 2.6	12.39 .39	40.3 1.8	21.02 .49	60.4 2.6	30.78 .30	12.7 2.3
30.6	48.38 .87	48.6 3.0	12.66 .25	38.6 1.6	21.49 .44	63.2 3.0	31.07 .27	15.1 2.3
Feb. 9.6	49.18 .73	51.8 3.3	12.89 .29	37.1 1.4	21.90 .37	66.3 3.2	31.32 .24	17.4 2.3
19.6	49.83 .57	55.2 3.6	13.09 .18	35.9 1.1	22.23 .30	69.6 3.4	31.54 .20	19.7 2.2
Mar. 1.6	50.31 .40	58.9 3.7	13.25 .14	34.9 0.8	22.49 .23	73.1 3.5	31.72 .16	21.8 2.0
11.5	50.63 .23	62.7 3.8	13.37 .10	34.2 0.5	22.68 .15	76.6 3.5	31.85 .11	23.8 1.9
21.5	50.77 +.06	66.5 3.8	13.44 .06	33.8 0.3	22.79 .08	80.1 3.4	31.94 .07	25.5 1.7
31.5	50.75 -.10	70.2 3.7	13.48 +.02	33.6 -0.1	22.83 +.01	83.5 3.3	32.00 .04	27.1 1.4
Apr. 10.4	50.57 .26	73.8 3.5	13.49 -.01	33.7 +0.1	22.81 -.06	86.7 3.1	32.02 +.01	28.4 1.2
20.4	50.24 .40	77.2 3.2	13.47 .03	33.9 0.3	22.72 .12	89.6 2.8	32.01 -.02	29.5 1.0
30.4	49.77 .53	80.3 2.9	13.42 .06	34.3 0.4	22.57 .17	92.3 2.5	31.98 .05	30.3 0.7
May 10.4	49.17 .65	83.1 2.6	13.36 .07	34.8 0.5	22.38 .22	94.6 2.1	31.92 .07	30.9 0.5
20.3	48.46 .76	85.4 2.1	13.28 .09	35.3 0.6	22.13 .26	96.6 1.7	31.84 .08	31.3 +0.3
30.3	47.66 .84	87.3 1.7	13.19 .09	36.0 0.7	21.85 .30	98.1 1.3	31.74 .10	31.4 0.0
June 9.3	46.78 .91	88.8 1.2	13.09 .10	36.6 0.7	21.54 .32	99.2 0.8	31.64 .11	31.4 -0.2
19.3	45.84 .96	89.7 0.6	12.99 .11	37.3 0.7	21.21 .34	99.8 +0.3	31.52 .12	31.1 0.4
29.2	44.88 .97	90.0 +0.1	12.88 .11	38.0 0.7	20.86 .35	99.8 -0.2	31.40 .13	30.6 0.6
July 9.2	43.91 .96	89.8 -0.5	12.78 .10	38.6 0.6	20.50 .35	99.5 0.6	31.27 .13	29.9 0.8
19.2	42.96 .93	89.0 1.0	12.68 .10	39.3 0.6	20.15 .34	98.6 1.1	31.14 .12	29.0 1.0
29.1	42.06 .86	87.8 1.5	12.58 .09	39.8 0.5	19.81 .32	97.3 1.5	31.02 .12	28.0 1.1
Aug. 8.1	41.24 .76	86.0 2.0	12.50 .08	40.3 0.4	19.50 .29	95.5 1.9	30.91 .11	26.8 1.2
18.1	40.53 .64	83.8 2.4	12.43 .06	40.7 0.3	19.23 .24	93.4 2.3	30.81 .09	25.6 1.2
28.1	39.96 .49	81.2 2.7	12.38 .04	40.9 +0.2	19.02 .19	91.0 2.5	30.73 .06	24.4 1.2
Sept. 7.0	39.55 .32	78.4 2.9	12.35 -.01	41.0 0.0	18.86 .12	88.4 2.7	30.68 -.04	23.1 1.2
17.0	39.32 -.13	75.4 3.0	12.35 +.02	40.9 -0.2	18.78 -.04	85.7 2.7	30.66 .00	22.0 1.1
27.0	39.29 +.08	72.3 3.0	12.39 .06	40.5 0.5	18.78 +.06	82.9 2.7	30.68 +.04	21.0 0.9
Oct. 7.0	39.47 .28	69.3 2.9	12.47 .10	39.9 0.7	18.87 .14	80.3 2.5	30.75 .09	20.2 0.6
16.9	39.86 .49	66.5 2.7	12.58 .14	39.1 1.0	19.05 .23	77.9 2.3	30.86 .13	19.7 -0.4
26.9	40.44 .68	63.9 2.3	12.74 .18	38.0 1.2	19.32 .31	75.8 1.9	31.01 .18	19.5 0.0
Nov. 5.9	41.21 .85	61.8 1.9	12.94 .22	36.6 1.5	19.68 .40	74.1 1.5	31.22 .23	19.6 +0.3
15.8	42.15 1.00	60.2 1.4	13.18 .26	35.0 1.7	20.11 .46	72.8 0.9	31.46 .27	20.2 0.7
25.8	43.20 1.10	59.1 0.8	13.46 .29	33.1 1.9	20.61 .52	72.2 -0.4	31.75 .30	21.1 1.1
Dec. 5.8	44.35 1.18	58.6 -0.1	13.76 .31	31.1 2.1	21.15 .56	72.1 +0.2	32.06 .33	22.3 1.4
15.8	45.55 1.21	58.8 +0.5	14.08 .32	29.0 2.1	21.72 .58	72.6 0.8	32.40 .34	23.9 1.7
25.7	46.77 1.20	59.6 1.1	14.41 .33	26.9 2.1	22.30 .58	73.7 1.4	32.74 .35	25.8 2.0
35.7	47.95+1.15	61.1 +1.8	14.74 +.32	24.7 -2.1	22.88 +.56	75.4 +1.9	33.09 +.34	27.9 +2.2

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	* $\kappa$ Draconis.		*32 Camelop. ( <i>fol.</i> )		12 Can. Venaticorum.		0 Virginis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> <sub>12</sub> <sup>m</sup> <sub>27</sub>	<sup>°</sup> <sub>70</sub> <sup>'</sup> <sub>30</sub>	<sup>h</sup> <sub>12</sub> <sup>m</sup> <sub>47</sub>	<sup>°</sup> <sub>84</sub> <sup>'</sup> <sub>6</sub>	<sup>h</sup> <sub>12</sub> <sup>m</sup> <sub>49</sub>	<sup>°</sup> <sub>39</sub> <sup>'</sup> <sub>1</sub>	<sup>h</sup> <sub>13</sub> <sup>m</sup> <sub>3</sub>	<sup>°</sup> <sub>4</sub> <sup>'</sup> <sub>50</sub>
Jan. 0.8	50.95 +.78	22.5 -0.9	66.44 +2.27	74.2 -0.8	52.70 +.39	27.0 -1.8	9.41 +.33	13.9 +2.1
10.7	51.73 .76	22.0 -0.9	68.73 2.27	73.7 -0.9	53.09 .38	25.4 1.3	9.74 .39	16.0 2.0
20.7	52.48 .72	22.1 +0.4	70.99 2.21	73.9 +0.5	53.47 .37	24.3 0.8	10.05 .30	18.0 1.9
30.7	53.17 .66	22.8 1.0	73.14 2.06	74.7 1.1	53.82 .34	23.8 -0.3	10.35 .28	19.9 1.8
Feb. 9.6	53.80 .58	24.2 1.6	75.11 1.84	76.1 1.7	54.15 .30	23.8 +0.3	10.62 .25	21.6 1.6
19.6	54.33 .48	26.0 2.1	76.82 1.56	78.1 2.2	54.43 .26	24.3 0.7	10.86 .22	23.0 1.3
Mar. 1.6	54.76 .36	28.4 2.5	78.22 1.22	80.5 2.6	54.66 .21	25.3 1.2	11.06 .18	24.2 1.1
11.6	55.06 .24	31.0 2.8	79.27 .85	83.3 2.9	54.84 .16	26.7 1.6	11.22 .15	25.2 0.8
21.5	55.24 +.12	34.0 3.0	79.92 .46	86.4 3.1	54.97 .10	28.5 1.9	11.35 .11	25.9 0.6
31.5	55.30 .00	37.0 3.0	80.18 +.06	89.5 3.2	55.06 .06	30.4 2.1	11.44 .08	26.4 0.3
Apr. 10.5	55.24 -.11	40.0 3.0	80.04 -.33	92.7 3.1	55.09 +.01	32.6 2.2	11.50 .04	26.6 +0.1
20.5	55.07 .21	42.9 2.8	79.52 .69	95.7 2.9	55.08 -.03	34.8 2.2	11.53 +.02	26.6 0.0
30.4	54.81 .31	45.6 2.5	78.66 1.02	98.5 2.6	55.03 .06	37.0 2.1	11.53 -.01	26.5 -0.2
May 10.4	54.46 .38	47.9 2.2	77.48 1.30	100.9 2.2	54.95 .09	39.1 2.0	11.51 .05	26.2 0.3
20.4	54.05 .44	49.9 1.7	76.05 1.54	103.0 1.8	54.85 .12	41.0 1.8	11.46 .07	25.8 0.4
30.3	53.59 .48	51.4 1.3	74.40 1.72	104.5 1.3	54.72 .14	42.6 1.5	11.40 .08	25.4 0.5
June 9.3	53.10 .50	52.4 0.7	72.61 1.84	105.5 0.7	54.57 .15	44.0 1.2	11.32 .09	24.8 0.6
19.3	52.58 .52	52.8 +0.2	70.72 1.91	106.0 +0.2	54.41 .16	45.0 0.9	11.23 .11	24.2 0.6
29.3	52.07 .51	52.8 -0.3	68.78 1.93	105.9 -0.4	54.25 .17	45.7 0.5	11.13 .11	23.6 0.6
July 9.2	51.56 .50	52.2 0.8	66.85 1.90	105.3 0.9	54.08 .17	46.0 +0.2	11.02 .11	23.0 0.6
19.2	51.07 .47	51.1 1.4	64.98 1.82	104.1 1.4	53.91 .17	46.0 -0.3	10.91 .12	22.3 0.6
29.2	50.62 .43	49.5 1.8	63.21 1.70	102.4 1.9	53.75 .16	45.5 0.7	10.79 .12	21.7 0.6
Aug. 8.2	50.22 .38	47.5 2.3	61.58 1.54	100.2 2.4	53.60 .14	44.6 1.0	10.68 .11	21.1 0.5
18.1	49.87 .32	45.0 2.7	60.13 1.35	97.6 2.8	53.46 .13	43.4 1.4	10.57 .10	20.6 0.5
28.1	49.59 .25	42.1 3.0	58.90 1.12	94.7 3.1	53.35 .10	41.9 1.7	10.48 .08	20.2 0.4
Sept. 7.1	49.38 .17	39.0 3.3	57.90 .86	91.4 3.4	53.26 .07	40.0 2.2	10.41 .06	19.9 -0.2
17.0	49.26 -.06	35.6 3.5	57.18 .58	87.8 3.6	53.21 -.03	37.8 2.4	10.37 -.03	19.8 0.0
27.0	49.23 +.02	32.0 3.7	56.75 -.27	84.1 3.8	53.19 +.01	35.3 2.6	10.35 +.01	19.9 +0.2
Oct. 7.0	49.29 .11	28.3 3.7	56.63 +.05	80.3 3.9	53.22 .06	32.6 2.8	10.38 .05	20.1 0.4
17.0	49.47 .23	24.5 3.7	56.84 .37	76.4 3.8	53.30 .11	29.7 3.0	10.45 .09	20.7 0.7
26.9	49.75 .33	20.8 3.6	57.38 .71	72.6 3.7	53.43 .16	26.6 3.1	10.56 .14	21.5 0.9
Nov. 5.9	50.13 .44	17.2 3.5	58.26 1.04	68.9 3.5	53.62 .21	23.5 3.1	10.72 .18	22.5 1.2
15.9	50.62 .53	13.8 3.2	59.46 1.35	65.5 3.2	53.85 .26	20.4 3.1	10.92 .22	23.8 1.5
25.9	51.20 .62	10.8 2.8	60.97 1.64	62.4 2.9	54.14 .31	17.3 3.0	11.17 .26	25.4 1.7
Dec. 5.8	51.85 .69	8.2 2.4	62.74 1.89	59.8 2.4	54.46 .34	14.5 2.8	11.44 .29	27.2 1.9
15.8	52.58 .74	6.0 1.9	64.75 2.09	57.7 1.9	54.82 .37	11.8 2.5	11.75 .31	29.2 2.0
25.8	53.34 .77	4.4 1.3	66.92 2.22	56.1 1.2	55.20 .39	9.6 2.1	12.07 .33	31.2 2.1
35.7	54.12 +.78	3.4 -0.7	69.19 +2.28	55.2 -0.6	55.59 +.39	7.7 -1.6	12.40 +.33	33.3 +2.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Virginis. (Spica.)		$\zeta$ Virginis.		$\eta$ Ursæ Majoris.		$\eta$ Bootis.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 13 <sup>m</sup> 18	<sup>°</sup> 10 <sup>'</sup> 28	<sup>h</sup> 13 <sup>m</sup> 28	<sup>°</sup> 0 <sup>'</sup> 4	<sup>h</sup> 13 <sup>m</sup> 42	<sup>°</sup> 49 <sup>'</sup> 57	<sup>h</sup> 13 <sup>m</sup> 48	<sup>°</sup> 19 <sup>'</sup> 2
Jan. 0.8	16.86 +.33	27.1 +2.0	0.23 +.32	34.9 -2.1	21.00 +.42	55.9 -2.3	25.68 +.33	78.7 -2.3
10.8	17.19 .33	29.1 2.0	0.56 .32	32.8 2.0	21.43 .44	53.9 1.6	26.01 .33	76.6 2.0
20.7	17.51 .31	31.1 2.0	0.87 .31	30.9 1.8	21.87 .43	52.6 1.1	26.34 .33	74.7 1.7
30.7	17.82 .29	33.1 1.9	1.18 .29	29.1 1.6	22.30 .42	51.8 -0.4	26.66 .31	73.2 1.3
Feb. 9.7	18.10 .27	34.9 1.8	1.46 .27	27.6 1.4	22.71 .39	51.7 +0.2	26.97 .29	72.2 0.9
19.7	18.35 .23	36.6 1.6	1.71 .24	26.3 1.1	23.08 .35	52.2 0.8	27.24 .26	71.5 -0.4
Mar. 1.6	18.56 .20	38.0 1.4	1.93 .20	25.3 0.8	23.41 .30	53.2 1.3	27.49 .23	71.3 0.0
11.6	18.74 .16	39.3 1.1	2.12 .17	24.6 0.6	23.68 .25	54.8 1.8	27.70 .19	71.5 +0.4
21.6	18.88 .13	40.3 0.9	2.27 .13	24.2 -0.3	23.90 .19	56.8 2.2	27.87 .16	72.1 0.7
31.5	18.99 .09	41.1 0.7	2.38 .10	24.1 0.0	24.07 .13	59.1 2.4	28.01 .12	73.0 1.0
Apr. 10.5	19.06 .06	41.6 0.5	2.46 .07	24.1 +0.2	24.17 .08	61.7 2.6	28.11 .08	74.2 1.3
20.5	19.11 +.03	42.0 0.3	2.52 .04	24.4 0.4	24.22 +.02	64.3 2.7	28.18 .05	75.5 1.4
30.5	19.13 .00	42.2 +0.1	2.54 +.01	24.9 0.5	24.22 -.03	67.1 2.7	28.21 +.02	77.0 1.5
May 10.4	19.12 -.02	42.2 0.0	2.54 -.01	25.4 0.6	24.16 .07	69.7 2.6	28.22 -.01	78.6 1.6
20.4	19.09 .04	42.1 -0.2	2.51 .04	26.1 0.7	24.07 .11	72.2 2.3	28.19 .04	80.1 1.5
30.4	19.03 .06	41.9 0.3	2.46 .06	26.8 0.7	23.94 .15	74.4 2.1	28.15 .06	81.6 1.4
June 9.4	18.96 .08	41.5 0.4	2.40 .07	27.5 0.7	23.77 .18	76.3 1.7	28.08 .08	83.0 1.3
19.3	18.88 .09	41.1 0.5	2.32 .09	28.2 0.7	23.58 .20	77.8 1.3	27.99 .10	84.2 1.1
29.3	18.78 .11	40.6 0.6	2.22 .10	28.9 0.7	23.36 .22	78.9 0.9	27.89 .11	85.3 0.9
July 9.3	18.67 .11	40.0 0.6	2.11 .11	29.6 0.6	23.13 .23	79.6 +0.5	27.77 .12	86.1 0.7
19.2	18.55 .12	39.3 0.6	2.00 .12	30.2 0.6	22.89 .24	79.8 0.0	27.64 .13	86.7 0.5
29.2	18.43 .12	38.7 0.7	1.88 .12	30.7 0.5	22.65 .24	79.6 -0.5	27.50 .14	87.0 +0.2
Aug. 8.2	18.30 .12	38.0 0.7	1.75 .12	31.1 0.4	22.41 .24	78.8 0.9	27.36 .14	87.1 -0.1
18.2	18.19 .11	37.4 0.6	1.64 .11	31.5 0.3	22.18 .22	77.7 1.4	27.22 .13	86.9 0.3
28.1	18.09 .09	36.8 0.6	1.53 .10	31.7 +0.1	21.97 .20	76.1 1.8	27.09 .12	86.4 0.6
Sept. 7.1	18.00 .07	36.2 0.5	1.44 .08	31.7 -0.1	21.78 .17	74.1 2.2	26.98 .10	85.6 0.9
17.1	17.94 .04	35.8 0.3	1.38 .05	31.6 0.2	21.63 .13	71.7 2.6	26.89 .08	84.5 1.2
27.1	17.91 -.01	35.6 -0.2	1.34 -.02	31.2 0.4	21.52 .09	69.0 2.9	26.82 .05	83.2 1.5
Oct. 7.0	17.92 +.03	35.5 +0.1	1.34 +.02	30.7 0.7	21.45 -.04	65.9 3.2	26.80 -.01	81.5 1.8
17.0	17.98 .08	35.7 0.3	1.38 .06	29.9 0.9	21.45 +.02	62.6 3.4	26.81 +.04	79.6 2.0
27.0	18.08 .12	36.1 0.6	1.47 .11	28.8 1.2	21.50 .09	59.2 3.5	26.87 .08	77.5 2.2
Nov. 5.9	18.22 .17	36.8 0.9	1.60 .16	27.5 1.4	21.62 .15	55.6 3.6	26.98 .13	75.2 2.4
15.9	18.42 .22	37.8 1.1	1.78 .20	26.0 1.7	21.80 .22	52.1 3.5	27.14 .18	72.7 2.6
25.9	18.65 .25	39.1 1.4	2.00 .24	24.2 1.9	22.05 .28	48.5 3.4	27.34 .23	70.0 2.6
Dec. 5.9	18.93 .29	40.6 1.6	2.26 .28	22.3 2.0	22.36 .33	45.2 3.2	27.50 .26	67.4 2.7
15.8	19.23 .31	42.3 1.8	2.55 .30	20.2 2.1	22.72 .38	42.2 2.9	27.87 .30	64.7 2.6
25.8	19.55 .33	44.2 2.0	2.86 .32	18.1 2.1	23.12 .41	39.5 2.5	28.18 .32	62.2 2.4
35.8	19.88 +.33	46.2 +2.0	3.19 +.33	16.0 -2.1	23.54 +.43	37.2 -2.0	28.50 +.33	59.8 -2.1

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\beta$ Centauri.		* $\alpha$ Draconis.		$\alpha$ Bootis. (Arcturus.)		$\theta$ Bootis.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 13 <sup>m</sup> 54	<sup>°</sup> 59 <sup>'</sup> 43	<sup>h</sup> 14 <sup>m</sup> 0	<sup>°</sup> 64 <sup>'</sup> 59	<sup>h</sup> 14 <sup>m</sup> 9	<sup>°</sup> 19 <sup>'</sup> 51	<sup>h</sup> 14 <sup>m</sup> 20	<sup>°</sup> 52 <sup>'</sup> 26
Jan. 0.8	35.09 +.55	58.6 +0.6	48.27 +.57	57.2 -2.2	39.90 +.32	57.1 -2.4	42.27 +.41	77.7 -2.6
10.8	35.65 .55	59.4 1.0	48.86 .60	55.3 1.6	40.22 .33	54.8 2.1	42.70 .44	75.4 2.1
20.8	36.20 .55	60.7 1.5	49.47 .61	54.0 1.0	40.55 .33	52.8 1.8	43.14 .45	73.6 1.4
30.7	36.74 .52	62.4 1.9	50.08 .60	53.4 -0.3	40.87 .31	51.2 1.4	43.59 .44	72.5 0.8
Feb. 9.7	37.25 .49	64.5 2.3	50.67 .57	53.5 +0.3	41.18 .30	50.0 1.0	44.03 .42	72.0 -0.2
19.7	37.71 .44	67.0 2.5	51.22 .52	54.2 1.0	41.47 .27	49.2 0.5	44.44 .39	72.1 +0.4
Mar. 1.7	38.13 .39	69.6 2.8	51.71 .46	55.5 1.6	41.72 .24	48.9 -0.1	44.81 .35	72.9 1.0
11.6	38.49 .33	72.5 2.9	52.13 .38	57.3 2.1	41.95 .21	49.1 +0.3	45.15 .30	74.2 1.6
21.6	38.80 .27	75.5 3.0	52.47 .30	59.7 2.5	42.14 .17	49.6 0.7	45.42 .25	76.0 2.0
31.6	39.04 .22	78.5 3.0	52.73 .21	62.3 2.8	42.30 .14	50.5 1.0	45.64 .19	78.3 2.4
Apr. 10.5	39.23 .16	81.5 3.0	52.90 .12	65.2 3.0	42.42 .10	51.6 1.3	45.81 .13	80.8 2.7
20.5	39.35 .09	84.4 2.9	52.97 +.03	68.3 3.0	42.50 .07	53.0 1.4	45.91 .08	83.6 2.8
30.5	39.42 +.04	87.3 2.7	52.96 -0.05	71.3 3.0	42.56 .04	54.5 1.6	45.96 +.02	86.4 2.8
May 10.5	39.43 -0.02	89.9 2.5	52.87 .13	74.3 2.9	42.58 +.01	56.1 1.6	45.95 -0.03	89.2 2.8
20.4	39.38 .06	92.4 2.3	52.71 .20	77.0 2.6	42.57 -0.02	57.8 1.6	45.89 .08	92.0 2.6
30.4	39.27 .13	94.5 2.0	52.48 .26	79.5 2.3	42.54 .05	59.3 1.5	45.79 .13	94.5 2.4
June 9.4	39.12 .18	96.3 1.7	52.19 .31	81.6 1.9	42.48 .07	60.8 1.4	45.64 .17	96.7 2.1
19.4	38.91 .22	97.8 1.3	51.85 .36	83.3 1.4	42.40 .09	62.1 1.2	45.46 .20	98.6 1.7
29.3	38.67 .26	98.9 0.9	51.48 .39	84.5 1.0	42.30 .11	63.2 1.0	45.24 .23	100.1 1.3
July 9.3	38.39 .29	99.5 +0.4	51.07 .41	85.2 +0.5	42.18 .13	64.1 0.8	45.00 .25	101.2 0.8
19.3	38.08 .32	99.8 0.0	50.65 .42	85.4 -0.1	42.05 .14	64.7 0.5	44.73 .27	101.8 +0.4
29.2	37.76 .33	99.5 -0.5	50.23 .43	85.0 0.6	41.90 .15	65.1 +0.2	44.46 .28	101.9 -0.1
Aug. 8.2	37.42 .33	98.8 0.9	49.80 .42	84.2 1.1	41.75 .15	65.2 0.0	44.18 .28	101.6 0.6
18.2	37.10 .32	97.7 1.3	49.39 .40	82.8 1.6	41.60 .15	65.0 -0.3	43.90 .27	100.7 1.1
28.2	36.79 .29	96.3 1.7	49.00 .37	81.0 2.1	41.46 .14	64.6 0.6	43.63 .26	99.4 1.5
Sept. 7.1	36.52 .25	94.4 2.0	48.65 .33	78.7 2.5	41.32 .12	63.8 0.9	43.38 .23	97.6 2.0
17.1	36.30 .19	92.3 2.2	48.35 .27	76.0 2.9	41.21 .10	62.7 1.2	43.17 .20	95.5 2.4
27.1	36.14 .12	90.0 2.4	48.11 .21	73.0 3.2	41.13 .07	61.3 1.5	42.99 .16	92.9 2.8
Oct. 7.1	36.06 -0.04	87.6 2.4	47.94 .13	69.6 3.5	41.07 -0.03	59.7 1.8	42.85 .11	90.0 3.1
17.0	36.06 +0.04	85.2 2.4	47.85 -0.05	66.0 3.7	41.06 +0.01	57.7 2.1	42.77 -0.05	86.7 3.3
27.0	36.14 .13	82.9 2.2	47.84 +0.04	62.3 3.8	41.10 .06	55.5 2.3	42.76 +0.02	83.3 3.5
Nov. 6.0	36.32 .22	80.7 2.0	47.93 .14	58.4 3.8	41.18 .11	53.1 2.5	42.81 .09	79.7 3.7
15.9	36.52 .31	78.9 1.6	48.12 .23	54.6 3.8	41.31 .16	50.5 2.7	42.93 .16	76.0 3.7
25.9	36.94 .39	77.5 1.2	48.39 .32	50.9 3.6	41.50 .20	47.8 2.7	43.13 .23	72.3 3.6
Dec. 5.9	37.36 .45	76.5 0.8	48.76 .41	47.4 3.3	41.72 .25	45.0 2.8	43.39 .29	68.7 3.5
15.9	37.84 .50	75.9 -0.3	49.21 .48	44.2 3.0	41.99 .28	42.3 2.7	43.71 .35	65.4 3.2
25.8	38.36 .54	75.9 +0.3	49.73 .54	41.4 2.5	42.28 .31	39.6 2.6	44.08 .39	62.3 2.8
35.8	38.91 +.56	76.4 +0.7	50.30 +.58	39.1 -2.0	42.60 +.33	37.2 -2.3	44.50 +.42	59.7 -2.4

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	*5 Ursæ Minoris.		α Centauri.		ε Bootis.		α Libræ.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 14 <sup>m</sup> 27	<sup>°</sup> 76 <sup>'</sup> 16	<sup>h</sup> 14 <sup>m</sup> 30	<sup>°</sup> 60 <sup>'</sup> 17	<sup>h</sup> 14 <sup>m</sup> 39	<sup>°</sup> 27 <sup>'</sup> 37	<sup>h</sup> 14 <sup>m</sup> 43	<sup>°</sup> 15 <sup>'</sup> 29
Jan. 0.8	45.90 +.88	30.6 -2.3	42.71 +.53	1.3 -0.1	14.45 +.31	38.4 -2.6	36.76 +.31	32.2 +1.5
10.8	46.81 .95	28.5 1.7	43.25 .55	1.6 +0.5	14.78 .33	36.0 2.2	37.08 .32	33.8 1.6
20.8	47.79 .99	27.1 1.1	43.81 .55	2.4 1.0	15.11 .34	33.9 1.9	37.41 .33	35.4 1.7
30.7	48.80 1.00	26.4 -0.4	44.36 .54	3.6 1.4	15.45 .33	32.2 1.4	37.73 .32	37.1 1.6
Feb. 9.7	49.80 .98	26.3 +0.3	44.89 .52	5.2 1.8	15.78 .32	31.1 0.9	38.05 .31	38.7 1.6
19.7	50.76 .92	26.9 0.9	45.39 .48	7.2 2.1	16.09 .30	30.5 -0.4	38.35 .29	40.3 1.5
Mar. 1.7	51.65 .83	28.1 1.5	45.85 .44	9.4 2.4	16.38 .28	30.3 +0.1	38.63 .28	41.7 1.3
11.6	52.42 .79	30.0 2.1	46.27 .39	11.9 2.6	16.64 .24	30.7 0.6	38.88 .24	42.9 1.2
21.6	53.08 .58	32.3 2.5	46.63 .33	14.6 2.7	16.87 .21	31.5 1.0	39.10 .21	44.0 1.0
31.6	53.58 .43	34.9 2.8	46.94 .28	17.4 2.8	17.06 .17	32.7 1.4	39.39 .18	44.8 0.8
Apr. 10.6	53.93 .37	37.9 3.0	47.19 .22	20.2 2.8	17.21 .14	34.3 1.7	39.45 .15	45.5 0.6
20.5	54.12 +.11	41.0 3.1	47.38 .16	23.0 2.8	17.33 .10	36.1 1.9	39.59 .12	46.1 0.5
30.5	54.15 -.05	44.2 3.1	47.51 .10	25.8 2.7	17.41 .07	38.1 2.0	39.69 .09	46.4 0.3
May 10.5	54.01 .21	47.3 3.0	47.58 +.04	28.5 2.6	17.46 +.03	40.2 2.1	39.77 .06	46.7 0.2
20.4	53.73 .35	50.2 2.8	47.59 -.02	30.9 2.4	17.48 .00	42.3 2.1	39.81 +.03	46.8 +0.1
30.4	53.32 .47	52.8 2.5	47.53 .08	33.3 2.2	17.46 -.03	44.3 2.0	39.83 .00	46.8 0.0
June 9.4	52.78 .58	55.1 2.1	47.42 .14	35.3 1.9	17.41 .06	46.2 1.8	39.82 -.02	46.7 -0.1
19.4	52.15 .68	56.9 1.6	47.25 .19	37.1 1.6	17.34 .09	47.9 1.6	39.79 .05	46.6 0.2
29.3	51.43 .75	58.3 1.1	47.04 .24	38.5 1.2	17.24 .11	49.4 1.3	39.72 .07	46.3 0.3
July 9.3	50.65 .81	59.2 0.6	46.77 .29	39.5 0.8	17.11 .13	50.6 1.1	39.63 .10	46.0 0.3
19.3	49.82 .84	59.6 +0.1	46.47 .32	40.1 +0.4	16.97 .15	51.5 0.7	39.52 .12	45.7 0.4
29.3	48.96 .86	59.4 -0.4	46.13 .35	40.2 0.0	16.81 .16	52.1 0.4	39.40 .14	45.3 0.4
Aug. 8.2	48.11 .85	58.7 1.0	45.77 .38	40.0 -0.5	16.65 .17	52.3 +0.1	39.25 .15	44.8 0.5
18.2	47.26 .82	57.4 1.5	45.42 .35	39.3 0.9	16.47 .17	52.2 -0.3	39.10 .15	44.3 0.5
28.2	46.46 .78	55.7 2.0	45.07 .34	38.1 1.3	16.30 .17	51.7 0.7	38.95 .15	43.8 0.5
Sept. 7.1	45.71 .71	53.5 2.4	44.74 .31	36.6 1.7	16.13 .16	50.9 1.0	38.81 .14	43.3 0.5
17.1	45.03 .63	50.9 2.8	44.46 .28	34.8 2.0	15.90 .13	49.7 1.4	38.68 .12	42.8 0.4
27.1	44.45 .59	47.8 3.2	44.22 .20	32.7 2.2	15.87 .11	48.1 1.7	38.58 .09	42.4 0.4
Oct. 7.1	43.99 .40	44.5 3.5	44.06 .12	30.4 2.3	15.78 .07	46.3 2.0	38.51 .05	42.1 0.2
17.0	43.66 .26	40.9 3.7	43.98 -.04	28.0 2.4	15.73 -.03	44.1 2.3	38.48 -.01	42.0 -0.1
27.0	43.47 -.11	37.1 3.8	43.99 +.06	25.7 2.3	15.72 +.02	41.6 2.6	38.49 +.04	42.0 +0.1
Nov. 6.0	43.44 +.05	33.3 3.9	44.09 .15	23.4 2.2	15.77 .07	38.9 2.8	38.56 .09	42.2 0.4
16.0	43.57 .22	29.4 3.8	44.29 .24	21.4 1.9	15.87 .13	36.0 2.9	38.67 .14	42.7 0.6
25.9	43.87 .38	25.6 3.7	44.57 .32	19.6 1.6	16.02 .18	33.1 3.0	38.84 .19	43.4 0.8
Dec. 5.9	44.34 .54	22.0 3.5	44.93 .40	18.2 1.2	16.23 .23	30.0 3.0	39.06 .24	44.4 1.1
15.9	44.95 .68	18.7 3.1	45.37 .46	17.3 0.7	16.48 .27	27.0 2.9	39.31 .27	45.6 1.3
25.8	45.71 .81	15.8 2.7	45.86 .51	16.8 -0.2	16.76 .30	24.2 2.7	39.60 .30	47.0 1.5
35.8	46.57 +.91	13.4 2.1	46.39 +.54	16.8 +0.2	17.07 +.32	21.6 -2.4	39.91 +.32	48.5 +1.6



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	*β Ursæ Minoris.		β Bootis.		β Libræ.		μ¹ Bootis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> 14 51	<sup>m</sup> 74° 41'	<sup>h</sup> 14 56	<sup>m</sup> 40° 54'	<sup>h</sup> 15 9	<sup>m</sup> 8° 53'	<sup>h</sup> 15 19	<sup>m</sup> 37° 49'
Jan. 0.8	2.85 +.74	17.1 -2.6	58.88 +.33	25.9 -2.8	56.14 +.29	42.1 +1.7	30.72 +.31	74.3 -2.9
10.8	3.64 .82	14.7 2.0	59.23 .36	23.3 2.4	56.44 .31	43.8 1.7	31.04 .33	71.5 2.5
20.8	4.49 .88	13.0 1.4	59.59 .37	21.1 1.9	56.75 .31	45.4 1.7	31.38 .35	69.2 2.1
30.8	5.39 .90	11.9 0.8	59.97 .37	19.5 1.4	57.07 .31	47.1 1.6	31.74 .36	67.3 1.6
Feb. 9.7	6.30 .90	11.5 -0.1	60.34 .36	18.4 0.8	57.38 .31	48.6 1.4	32.09 .35	66.0 1.0
19.7	7.19 .86	11.7 +0.6	60.70 .35	17.9 -0.2	57.68 .29	49.9 1.3	32.44 .34	65.3 -0.5
Mar. 1.7	8.02 .79	12.6 1.2	61.03 .32	18.0 +0.4	57.96 .27	51.1 1.1	32.77 .32	65.1 +0.1
11.7	8.77 .70	14.2 1.8	61.34 .29	18.7 1.0	58.22 .25	52.0 0.8	33.08 .29	65.6 0.7
21.6	9.42 .59	16.2 2.3	61.61 .25	19.9 1.4	58.46 .22	52.7 0.6	33.36 .26	66.5 1.2
31.6	9.95 .46	18.7 2.7	61.84 .21	21.6 1.9	58.67 .20	53.2 0.4	33.60 .22	68.0 1.7
Apr. 10.6	10.34 .32	21.6 2.9	62.03 .17	23.6 2.2	58.85 .17	53.5 +0.2	33.81 .19	69.9 2.0
20.5	10.59 .18	24.6 3.1	62.17 .12	26.0 2.4	59.01 .14	53.6 0.0	33.97 .15	72.1 2.3
30.5	10.70 +.04	27.8 3.2	62.27 .08	28.5 2.6	59.13 .11	53.5 -0.1	34.10 .11	74.5 2.5
May 10.5	10.67 -1.10	30.9 3.1	62.33 +.04	31.1 2.6	59.23 .08	53.3 0.3	34.19 .06	77.0 2.6
20.5	10.50 .24	34.0 2.9	62.34 .00	33.7 2.6	59.30 .06	53.0 0.4	34.23 +.03	79.6 2.6
30.4	10.20 .36	36.8 2.7	62.32 -0.04	36.2 2.4	59.34 +.03	52.6 0.4	34.24 -0.01	82.2 2.5
June 9.4	9.78 .47	39.3 2.3	62.25 .08	38.6 2.2	59.35 .00	52.2 0.5	34.20 .05	84.6 2.3
19.4	9.27 .56	41.4 1.9	62.16 .11	40.7 1.9	59.34 -0.03	51.7 0.5	34.13 .09	86.8 2.1
29.4	8.66 .64	43.1 1.5	62.03 .15	42.5 1.6	59.29 .06	51.2 0.5	34.03 .12	88.7 1.8
July 9.3	7.99 .70	44.3 1.0	61.87 .17	44.0 1.3	59.22 .09	50.7 0.5	33.89 .15	90.4 1.5
19.3	7.26 .75	45.0 +0.4	61.68 .20	45.0 0.9	59.12 .11	50.3 0.5	33.73 .18	91.6 1.1
29.3	6.50 .77	45.2 -0.1	61.47 .21	45.7 +0.4	59.00 .13	49.8 0.4	33.54 .20	92.5 0.7
Aug. 8.2	5.72 .78	44.8 0.6	61.26 .22	45.9 0.0	58.86 .14	49.4 0.4	33.34 .21	93.0 +0.3
18.2	4.93 .77	44.0 1.1	61.04 .23	45.7 -0.4	58.71 .15	49.0 0.4	33.22 .22	93.1 -0.2
28.2	4.17 .74	42.6 1.6	60.81 .22	45.0 0.9	58.56 .15	48.6 0.3	32.90 .22	92.7 0.6
Sept. 7.2	3.45 .70	40.7 2.1	60.59 .21	43.9 1.3	58.41 .15	48.3 0.2	32.68 .21	91.9 1.0
17.1	2.78 .63	38.3 2.5	60.39 .19	42.4 1.7	58.27 .13	48.1 -0.1	32.47 .20	90.7 1.4
27.1	2.19 .54	35.6 2.9	60.22 .16	40.5 2.1	58.15 .11	48.1 0.0	32.29 .17	89.0 1.8
Oct. 7.1	1.69 .44	32.4 3.3	60.08 .12	38.2 2.5	58.06 .07	48.1 +0.1	32.13 .13	87.0 2.2
17.1	1.31 .32	29.0 3.5	59.99 .07	35.5 2.8	58.00 -0.03	48.3 0.3	32.02 .09	84.6 2.6
27.0	1.06 .19	25.4 3.7	59.94 -0.02	32.6 3.1	57.99 +.01	48.7 0.5	31.95 -0.04	81.9 2.9
Nov. 6.0	0.94 -0.04	21.5 3.9	59.95 +0.04	29.4 3.3	58.02 .06	49.3 0.7	31.94 +0.02	78.9 3.1
16.0	0.98 +.11	17.6 3.9	60.02 .10	26.1 3.4	58.11 .11	50.1 0.9	31.98 .07	75.7 3.3
25.9	1.16 .26	13.8 3.8	60.15 .16	22.6 3.5	58.25 .16	51.2 1.2	32.08 .13	72.3 3.4
Dec. 5.9	1.51 .41	10.1 3.6	60.35 .22	19.2 3.4	58.43 .21	52.4 1.3	32.24 .19	68.9 3.4
15.9	1.99 .55	6.6 3.3	60.59 .27	15.8 3.3	58.66 .25	53.9 1.5	32.46 .24	65.6 3.3
25.9	2.61 .68	3.4 2.9	60.88 .31	12.6 3.0	58.93 .28	55.4 1.6	32.72 .28	62.4 3.1
35.8	3.34 +.78	0.8 -2.4	61.21 +.35	9.7 -2.6	59.22 +.30	57.1 +1.7	33.02 +.32	59.4 -2.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	*γ <sup>2</sup> Ursæ Minoris.		α Coronæ Borealis.		α Serpentis.		ε Serpentis.									
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.								
	<sup>h</sup> 15	<sup>m</sup> 20	<sup>h</sup> 15	<sup>m</sup> 29	<sup>h</sup> 15	<sup>m</sup> 37	<sup>h</sup> 15	<sup>m</sup> 44								
	<sup>s</sup> 15	<sup>s</sup> 20	<sup>s</sup> 15	<sup>s</sup> 29	<sup>s</sup> 15	<sup>s</sup> 37	<sup>s</sup> 15	<sup>s</sup> 44								
Jan. 0.9	53.54	+59	54.1	-2.9	6.79	+28	27.4	-2.8	47.36	+26	28.8	-2.2	15.61	+26	32.1	-2.1
10.8	54.18	.68	51.4	2.4	7.08	.30	24.7	2.5	47.64	.29	26.7	2.1	15.88	.28	30.0	2.0
20.8	54.89	.74	49.2	1.8	7.40	.32	22.4	2.1	47.93	.30	24.7	1.9	16.18	.30	28.1	1.8
30.8	55.66	.78	47.7	1.2	7.72	.33	20.5	1.7	48.24	.31	22.9	1.6	16.48	.30	26.3	1.6
Feb. 9.8	56.45	.79	46.8	-0.5	8.05	.32	19.0	1.2	48.55	.30	21.4	1.3	16.79	.30	24.8	1.4
19.7	57.23	.77	46.6	+0.2	8.37	.31	18.0	0.7	48.84	.29	20.2	1.0	17.09	.29	23.6	1.0
Mar. 1.7	57.99	.73	47.1	0.8	8.68	.30	17.6	-0.2	49.13	.28	19.4	0.7	17.37	.28	22.7	0.7
11.7	58.69	.67	48.3	1.4	8.96	.27	17.7	+0.3	49.40	.26	18.9	-0.3	17.65	.26	22.2	-0.3
21.7	59.32	.58	50.0	2.0	9.23	.25	18.3	0.8	49.65	.24	18.8	+0.1	17.90	.24	22.0	0.0
31.6	59.86	.48	52.2	2.4	9.46	.22	19.3	1.2	49.88	.21	19.1	0.4	18.13	.22	22.2	+0.3
Apr. 10.6	60.29	.37	54.8	2.8	9.66	.19	20.7	1.6	50.08	.19	19.6	0.7	18.33	.19	22.6	0.6
20.6	60.60	.25	57.8	3.0	9.83	.15	22.5	1.9	50.25	.16	20.4	0.9	18.51	.17	23.3	0.8
30.5	60.79	.13	60.9	3.1	9.96	.12	24.5	2.1	50.39	.13	21.4	1.1	18.66	.14	24.2	1.0
May 10.5	60.86	+0.1	64.1	3.2	10.06	.08	26.6	2.2	50.51	.10	22.6	1.2	18.79	.11	25.3	1.1
20.5	60.81	-11	67.2	3.1	10.13	.05	28.8	2.2	50.60	.07	23.8	1.3	18.88	.08	26.5	1.2
30.5	60.64	.22	70.2	2.9	10.16	+0.1	31.0	2.2	50.65	.04	25.1	1.3	18.95	.05	27.7	1.2
June 9.4	60.36	.33	73.0	2.6	10.16	-0.2	33.2	2.1	50.68	+0.1	26.4	1.3	18.98	+0.2	29.0	1.2
19.4	59.99	.42	75.4	2.3	10.12	.05	35.1	1.9	50.68	-0.2	27.7	1.2	18.98	-0.1	30.1	1.1
29.4	59.52	.50	77.5	1.8	10.05	.08	36.9	1.7	50.64	.05	28.9	1.1	18.96	.04	31.2	1.1
July 9.4	58.98	.57	79.1	1.4	9.95	.11	38.5	1.4	50.58	.08	29.9	1.0	18.90	.07	32.2	0.9
19.3	58.38	.62	80.3	0.9	9.83	.14	39.7	1.1	50.49	.10	30.8	0.8	18.81	.10	33.1	0.8
29.3	57.74	.66	80.9	+0.4	9.68	.16	40.6	0.8	50.37	.13	31.6	0.7	18.70	.12	33.8	0.7
Aug. 8.3	57.06	.69	81.0	-0.1	9.51	.18	41.2	0.4	50.24	.15	32.1	0.5	18.56	.14	34.4	0.5
18.2	56.36	.69	80.6	0.7	9.32	.19	41.5	+0.1	50.08	.16	32.5	0.3	18.41	.16	34.8	0.3
28.2	55.67	.68	79.7	1.2	9.13	.19	41.4	-0.3	49.92	.16	32.7	+0.1	18.25	.16	35.0	+0.1
Sept. 7.2	55.00	.66	78.2	1.7	8.94	.19	40.9	0.7	49.76	.16	32.7	-0.1	18.09	.16	35.1	-0.1
17.2	54.36	.61	76.3	2.2	8.76	.17	40.0	1.1	49.60	.15	32.4	0.4	17.93	.15	34.9	0.3
27.1	53.78	.54	73.9	2.6	8.60	.15	38.8	1.4	49.46	.13	31.9	0.6	17.79	.13	34.5	0.5
Oct. 7.1	53.27	.46	71.1	3.0	8.47	.12	37.2	1.8	49.35	.10	31.2	0.9	17.67	.10	33.8	0.8
17.1	52.85	.36	68.0	3.3	8.36	.08	35.3	2.1	49.26	.08	30.2	1.1	17.58	.07	32.9	1.0
27.1	52.54	.25	64.5	3.6	8.31	-0.3	33.0	2.4	49.22	-0.2	29.0	1.4	17.53	-0.3	31.8	1.2
Nov. 6.0	52.35	-13	60.8	3.8	8.30	+0.2	30.5	2.6	49.22	+0.3	27.5	1.6	17.53	+0.2	30.5	1.5
16.0	52.29	+0.1	57.0	3.9	8.34	.07	27.7	2.8	49.27	.08	25.8	1.8	17.57	.07	28.9	1.7
26.0	52.36	.14	53.1	3.9	8.44	.12	24.8	3.0	49.37	.12	23.9	2.0	17.67	.12	27.1	1.9
Dec. 5.9	52.57	.28	49.3	3.7	8.59	.17	21.8	3.0	49.52	.17	21.8	2.1	17.81	.17	25.2	2.0
15.9	52.91	.41	45.6	3.5	8.78	.22	18.7	3.0	49.71	.21	19.7	2.2	18.00	.21	23.1	2.1
25.9	53.38	.52	42.2	3.2	9.03	.26	15.7	2.9	49.95	.25	17.4	2.2	18.23	.25	21.0	2.1
35.9	53.96	+0.2	39.2	-2.8	9.31	+0.30	12.9	-2.7	50.21	+0.28	15.2	-2.1	18.49	+0.27	18.9	-2.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	* $\zeta$ Ursæ Minoris.		$\epsilon$ Coronæ Borealis.		$\delta$ Scorpii.		$\beta^1$ Scorpii.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 15 48	<sup>m</sup> 78° 11'	<sup>h</sup> 15 52	<sup>m</sup> 27° 15'	<sup>h</sup> 15 52	<sup>m</sup> 22° 14'	<sup>h</sup> 15 57	<sup>m</sup> 19° 26'
Jan. 0.9	42.01 +.72	40.8 -3.1	8.15 +.26	32.9 -2.8	33.71 +.28	34.6 +0.9	47.56 +.28	28.4 +1.0
10.9	42.80 .86	37.9 2.6	8.43 .29	30.1 2.6	34.00 .31	35.5 1.0	47.85 .30	29.5 1.1
20.8	43.73 .99	35.5 2.1	8.73 .31	27.7 2.2	34.32 .32	36.6 1.1	48.16 .32	30.6 1.2
30.8	44.77 1.07	33.8 1.5	9.05 .32	25.7 1.8	34.65 .33	37.7 1.2	48.48 .32	31.8 1.2
Feb. 9.8	45.88 1.12	32.6 0.8	9.37 .32	24.1 1.3	34.98 .33	38.9 1.2	48.80 .32	33.0 1.2
19.8	47.01 1.12	32.1 -0.2	9.69 .32	23.0 0.8	35.31 .32	40.1 1.2	49.12 .32	34.2 1.1
Mar. 1.7	48.13 1.09	32.3 +0.5	10.00 .30	22.4 -0.3	35.62 .31	41.2 1.1	49.43 .30	35.2 1.0
11.7	49.19 1.09	33.2 1.2	10.30 .30	22.4 +0.2	35.92 .30	42.3 1.0	49.73 .30	36.2 0.9
21.7	50.17 .91	34.6 1.7	10.57 .28	22.9 0.7	36.20 .27	43.3 0.9	50.01 .27	37.1 0.8
31.6	51.02 .78	36.6 2.2	10.82 .24	23.8 1.1	36.46 .25	44.1 0.8	50.26 .25	37.8 0.7
Apr. 10.6	51.73 .63	39.1 2.6	11.04 .21	25.2 1.5	36.69 .22	44.9 0.7	50.50 .22	38.4 0.5
20.6	52.27 .46	41.9 2.9	11.23 .17	26.9 1.8	36.90 .19	45.5 0.6	50.71 .20	38.9 0.4
30.6	52.64 .28	44.9 3.1	11.39 .14	28.8 2.1	37.08 .17	46.1 0.5	50.89 .17	39.3 0.3
May 10.5	52.82 +.09	48.0 3.2	11.51 .11	31.0 2.2	37.23 .14	46.5 0.4	51.04 .14	39.6 0.2
20.5	52.81 -1.10	51.2 3.1	11.60 .07	33.3 2.3	37.35 .10	46.9 0.4	51.16 .11	39.8 0.2
30.5	52.62 .27	54.3 3.0	11.65 +.04	35.5 2.3	37.44 .07	47.2 0.3	51.26 .08	39.9 0.1
June 9.5	52.27 .44	57.2 2.8	11.67 .00	37.8 2.2	37.50 +.04	47.5 0.2	51.32 .04	40.0 +0.1
19.4	51.75 .59	59.8 2.5	11.65 -.04	39.9 2.0	37.52 .00	47.7 0.2	51.34 +.01	40.0 0.0
29.4	51.08 .73	62.1 2.1	11.60 .07	41.8 1.8	37.50 -.03	47.8 +0.1	51.33 -.03	40.0 0.0
July 9.4	50.29 .85	64.0 1.7	11.51 .10	43.5 1.6	37.45 .07	47.9 0.0	51.29 .06	40.0 -0.1
19.3	49.39 .94	65.4 1.2	11.40 .13	44.9 1.3	37.37 .10	47.9 0.0	51.21 .09	39.9 0.1
29.3	48.40 1.02	66.4 0.7	11.25 .16	46.0 0.9	37.26 .13	47.8 -0.1	51.10 .12	39.8 0.2
Aug. 8.3	47.36 1.07	66.8 +0.2	11.09 .18	46.8 0.6	37.12 .15	47.7 0.2	50.97 .14	39.6 0.2
18.3	46.27 1.09	66.7 -0.3	10.90 .19	47.2 +0.2	36.96 .16	47.4 0.3	50.81 .16	39.3 0.3
28.2	45.17 1.09	66.1 0.9	10.70 .20	47.3 -0.1	36.79 .17	47.1 0.3	50.64 .17	39.1 0.3
Sept. 7.2	44.08 1.07	65.0 1.4	10.51 .20	46.9 0.5	36.61 .17	46.8 0.4	50.47 .17	38.7 0.3
17.2	43.04 1.01	63.4 1.8	10.31 .19	46.2 0.9	36.44 .16	46.3 0.4	50.30 .16	38.4 0.4
27.2	42.05 .94	61.3 2.3	10.13 .17	45.2 1.3	36.29 .14	45.9 0.5	50.15 .14	38.0 0.3
Oct. 7.1	41.16 .83	58.8 2.7	9.98 .14	43.7 1.6	36.16 .11	45.4 0.4	50.02 .11	37.7 0.3
17.1	40.39 .70	55.9 3.1	9.86 .10	41.9 2.0	36.06 .07	45.0 0.4	49.92 .07	37.4 0.2
27.1	39.77 .54	52.6 3.4	9.77 .06	39.8 2.3	36.01 -.03	44.7 0.3	49.87 -.03	37.2 -0.1
Nov. 6.0	39.30 .37	49.1 3.6	9.74 -.01	37.3 2.6	36.01 +.03	44.5 -0.2	49.86 +.02	37.2 0.0
16.0	39.02 -.18	45.4 3.8	9.75 +.04	34.6 2.8	36.06 .08	44.4 0.0	49.90 .07	37.3 +0.2
26.0	38.94 +.02	41.6 3.8	9.83 .10	31.7 2.9	36.16 .13	44.5 +0.2	50.00 .12	37.5 0.4
Dec. 6.0	39.06 .22	37.8 3.7	9.95 .15	28.8 3.0	36.32 .18	44.8 0.4	50.15 .17	38.0 0.6
15.9	39.38 .42	34.1 3.6	10.12 .20	25.7 3.0	36.53 .22	45.3 0.6	50.35 .22	38.6 0.7
25.9	39.89 .61	30.6 3.3	10.34 .24	22.7 2.9	36.78 .27	46.0 0.8	50.59 .26	39.5 0.9
35.9	40.59 +.78	27.5 -2.9	10.60 +.27	19.8 -2.7	37.06 +.30	46.9 +0.9	50.86 +.22	40.4 +1.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	*Groombridge 2320.		δ Ophiuchi.		τ Herculis.		α Scorpii. (Antares.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 16	<sup>m</sup> 5	<sup>h</sup> 16	<sup>m</sup> 7	<sup>h</sup> 16	<sup>m</sup> 15	<sup>h</sup> 16	<sup>m</sup> 21
		68° 9'		3° 21'		46° 37'		26° 8'
Jan. 0.9	54.87 +.41	15.6 -3.3	27.19 +.25	9.8 +1.7	45.91 +.27	34.1 -3.3	20.81 +.27	5.7 +0.5
10.9	55.32 .49	12.5 2.9	27.46 .27	11.5 1.7	46.20 .31	31.0 3.0	21.10 .30	6.3 0.6
20.9	55.85 .56	9.8 2.4	27.74 .29	13.2 1.6	46.53 .34	28.2 2.5	21.41 .32	7.0 0.8
30.8	56.44 .61	7.7 1.8	28.04 .30	14.8 1.5	46.89 .37	25.9 2.0	21.73 .33	7.9 0.9
Feb. 9.8	57.07 .64	6.2 1.2	28.34 .30	16.1 1.3	47.27 .38	24.2 1.5	22.07 .33	8.8 0.9
19.8	57.71 .65	5.4 -0.5	28.64 .30	17.3 1.1	47.65 .38	23.0 0.8	22.40 .33	9.7 0.9
Mar. 1.7	58.36 .63	5.2 +0.2	28.94 .29	18.3 0.8	48.04 .38	22.5 -0.2	22.73 .32	10.6 0.9
11.7	58.98 .60	5.7 0.8	29.22 .27	19.0 0.5	48.40 .36	22.6 +0.4	23.05 .31	11.5 0.9
21.7	59.56 .55	6.9 1.5	29.49 .26	19.4 +0.3	48.75 .33	23.3 1.0	23.35 .29	12.4 0.8
31.7	60.08 .48	8.6 2.0	29.73 .24	19.5 0.0	49.07 .30	24.6 1.6	23.64 .27	13.2 0.8
Apr. 10.6	60.53 .41	10.9 2.4	29.96 .21	19.4 -0.2	49.35 .26	26.5 2.0	23.90 .25	13.9 0.7
20.6	60.90 .32	13.5 2.8	30.16 .19	19.0 0.4	49.60 .22	28.7 2.4	24.14 .23	14.6 0.7
30.6	61.17 .23	16.5 3.0	30.33 .16	18.5 0.6	49.80 .18	31.3 2.7	24.36 .20	15.2 0.6
May 10.5	61.35 .13	19.6 3.2	30.48 .13	17.9 0.7	49.95 .13	34.1 2.9	24.54 .17	15.8 0.5
20.5	61.43 +.03	22.8 3.2	30.60 .11	17.1 0.8	50.06 .08	37.0 2.9	24.70 .14	16.3 0.5
30.5	61.42 -0.06	26.0 3.1	30.69 .08	16.3 0.8	50.12 +.03	40.0 2.9	24.82 .10	16.8 0.5
June 9.5	61.30 .16	29.1 3.0	30.75 .04	15.4 0.8	50.12 -0.02	42.9 2.8	24.90 .07	17.3 0.4
19.4	61.10 .25	31.9 2.7	30.78 +0.1	14.6 0.8	50.08 .07	45.6 2.6	24.95 +0.3	17.7 0.4
29.4	60.81 .32	34.5 2.4	30.77 -0.02	13.8 0.8	49.99 .11	48.1 2.4	24.96 -0.1	18.0 0.3
July 9.4	60.45 .40	36.6 2.0	30.73 .06	13.1 0.7	49.86 .15	50.3 2.0	24.93 .05	18.3 0.3
19.4	60.02 .46	38.4 1.5	30.66 .09	12.4 0.6	49.69 .19	52.2 1.7	24.87 .08	18.5 0.2
29.3	59.53 .51	39.7 1.1	30.56 .11	11.8 0.5	49.48 .23	53.6 1.3	24.76 .12	18.7 +0.1
Aug. 8.3	59.00 .55	40.5 +0.6	30.44 .14	11.3 0.4	49.24 .26	54.7 0.8	24.63 .15	18.7 0.0
18.3	58.43 .57	40.8 0.0	30.29 .15	11.0 0.3	48.97 .28	55.3 +0.4	24.47 .17	18.7 -0.1
28.3	57.85 .58	40.6 -0.5	30.13 .16	10.7 0.2	48.69 .29	55.5 -0.1	24.30 .18	18.5 0.2
Sept. 7.2	57.27 .58	39.8 1.0	29.97 .17	10.5 -0.1	48.40 .29	55.1 0.6	24.11 .19	18.3 0.3
17.2	56.69 .56	38.6 1.5	29.80 .16	10.5 +0.1	48.11 .28	54.2 1.1	23.92 .18	17.9 0.4
27.2	56.15 .52	36.8 2.0	29.65 .14	10.7 0.2	47.84 .26	52.9 1.5	23.75 .16	17.5 0.5
Oct. 7.1	55.66 .46	34.6 2.5	29.52 .12	10.9 0.4	47.59 .23	51.1 2.0	23.60 .14	17.0 0.5
17.1	55.23 .39	31.9 2.9	29.41 .08	11.4 0.6	47.38 .19	48.9 2.4	23.48 .10	16.5 0.5
27.1	54.87 .31	28.9 3.2	29.35 -0.04	12.0 0.8	47.22 .14	46.3 2.8	23.40 -0.06	16.0 0.5
Nov. 6.1	54.61 .21	25.5 3.5	29.33 .00	12.9 0.9	47.10 .08	43.4 3.1	23.37 .00	15.6 0.4
16.0	54.45 -1.10	21.9 3.7	29.36 +0.05	13.9 1.1	47.05 -0.02	40.1 3.4	23.39 +0.05	15.2 0.3
26.0	54.40 +0.1	18.1 3.8	29.43 .10	15.2 1.3	47.07 +0.05	36.6 3.5	23.47 .10	15.0 -0.1
Dec. 6.0	54.47 .13	14.3 3.8	29.56 .15	16.6 1.5	47.15 .11	33.1 3.6	23.60 .16	15.0 +0.1
16.0	54.65 .24	10.4 3.7	29.73 .19	18.2 1.6	47.20 .18	29.4 3.6	23.78 .21	15.1 0.2
25.9	54.95 .34	6.8 3.5	29.95 .23	19.8 1.7	47.50 .24	25.9 3.4	24.01 .25	15.5 0.4
35.9	55.34 +.44	3.4 -3.2	30.20 +.26	21.5 +1.7	47.76 +.28	22.6 -3.2	24.28 +.28	16.0 +0.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma$ Draconis.		*15 Draconis (A).		$\zeta$ Ophiuchi.		* $\alpha$ Trianguli Australis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 16 22 <sup>m</sup>	61° 48'	<sup>h</sup> 16 28 <sup>m</sup>	69° 2'	<sup>h</sup> 16 29 <sup>m</sup>	10° 17'	<sup>h</sup> 16 34 <sup>m</sup>	68° 46'
Jan. 0.9	11.04 +.32	38.8 -3.4	11.45 +.36	62.9 -3.4	55.02 +.24	48.4 +1.3	45.18 +.54	38.8 -1.7
10.9	11.39 .38	35.5 3.1	11.86 .46	59.6 3.1	55.27 .27	49.7 1.3	45.77 .62	37.3 1.3
20.8	11.81 .44	32.7 2.6	12.36 .54	56.8 2.6	55.55 .29	51.0 1.3	46.42 .68	36.1 0.9
30.8	12.28 .49	30.3 2.0	12.94 .60	54.4 2.1	55.85 .30	52.3 1.2	47.13 .73	35.4 0.5
Feb. 9.8	12.78 .51	28.6 1.4	13.57 .64	52.6 1.4	56.15 .30	53.5 1.1	47.87 .75	35.1 -0.1
19.8	13.30 .52	27.5 0.8	14.22 .66	51.5 0.8	56.46 .30	54.6 1.0	48.63 .76	35.2 +0.3
Mar. 1.7	13.82 .58	27.0 -0.1	14.89 .68	51.1 -0.1	56.76 .30	55.5 0.8	49.39 .75	35.8 0.7
11.7	14.33 .49	27.3 +0.6	15.55 .64	51.3 +0.6	57.05 .29	56.2 0.6	50.13 .73	36.7 1.1
21.7	14.81 .46	28.2 1.2	16.17 .60	52.2 1.2	57.33 .27	56.7 0.4	50.85 .70	37.9 1.4
31.7	15.26 .48	29.7 1.8	16.74 .54	53.7 1.8	57.59 .25	56.9 +0.2	51.53 .65	39.5 1.7
Apr. 10.6	15.64 .36	31.7 2.3	17.25 .46	55.8 2.3	57.84 .23	57.0 0.0	52.15 .60	41.4 2.0
20.6	15.98 .30	34.2 2.6	17.67 .38	58.3 2.7	58.06 .21	56.9 -0.2	52.72 .54	43.6 2.2
30.6	16.24 .22	37.0 2.9	18.00 .28	61.1 3.0	58.26 .19	56.7 0.3	53.23 .46	45.9 2.4
May 10.5	16.43 .15	40.0 3.1	18.24 .19	64.2 3.1	58.44 .18	56.4 0.4	53.65 .38	48.4 2.5
20.5	16.54 +.08	43.2 3.2	18.37 +.08	67.4 3.2	58.59 .13	56.0 0.5	53.99 .30	51.0 2.6
30.5	16.58 .00	46.4 3.2	18.41 -.02	70.6 3.2	58.70 .10	55.5 0.5	54.25 .20	53.6 2.7
June 9.5	16.55 -.07	49.6 3.0	18.34 .12	73.8 3.1	58.79 .07	55.0 0.5	54.40 .11	56.3 2.6
19.4	16.44 .14	52.5 2.8	18.17 .21	76.8 2.9	58.84 +.03	54.5 0.5	54.46 +.01	58.9 2.5
29.4	16.27 .21	55.2 2.5	17.91 .30	79.5 2.6	58.85 .00	54.0 0.5	54.42 -.09	61.3 2.4
July 9.4	16.03 .27	57.6 2.2	17.56 .38	81.9 2.2	58.83 -.04	53.5 0.4	54.28 .19	63.6 2.1
19.4	15.73 .32	59.6 1.8	17.14 .46	84.0 1.8	58.77 .07	53.1 0.4	54.05 .26	65.6 1.9
29.3	15.38 .37	61.1 1.3	16.65 .52	85.5 1.4	58.69 .10	52.7 0.4	53.73 .36	67.3 1.5
Aug. 8.3	14.98 .41	62.2 0.8	16.11 .57	86.7 0.9	58.57 .13	52.4 0.3	53.33 .42	68.6 1.1
18.3	14.56 .44	62.8 +0.3	15.52 .60	87.3 +0.4	58.43 .15	52.1 0.3	52.87 .48	69.5 0.7
28.2	14.11 .45	62.9 -0.2	14.91 .62	87.4 -0.2	58.27 .17	51.8 0.2	52.37 .51	70.0 +0.2
Sept. 7.2	13.66 .45	62.4 0.7	14.28 .62	86.9 0.7	58.10 .17	51.7 0.2	51.85 .52	70.0 -0.3
17.2	13.21 .44	61.5 1.2	13.66 .61	86.0 1.2	57.93 .17	51.5 -0.1	51.33 .51	69.4 0.8
27.2	12.78 .41	60.0 1.7	13.07 .58	84.6 1.7	57.76 .15	51.5 0.0	50.83 .47	68.5 1.2
Oct. 7.1	12.38 .37	58.0 2.2	12.51 .53	82.6 2.2	57.62 .13	51.5 +0.1	50.38 .41	67.0 1.6
17.1	12.13 .32	55.6 2.6	12.01 .46	80.2 2.6	57.50 .10	51.7 0.2	50.01 .32	65.2 2.0
27.1	11.74 .26	52.8 3.0	11.59 .38	77.4 3.0	57.42 .06	52.0 0.4	49.72 .22	63.1 2.2
Nov. 6.1	11.52 .18	49.6 3.3	11.25 .28	74.2 3.3	57.38 -.01	52.4 0.5	49.55 -.11	60.8 2.4
16.0	11.39 -.09	46.1 3.6	11.02 .17	70.7 3.6	57.39 +.04	53.0 0.7	49.50 +.01	58.3 2.5
26.0	11.34 .00	42.5 3.8	10.91 -.06	67.0 3.8	57.45 .09	53.8 0.8	49.57 .14	55.8 2.5
Dec. 6.0	11.38 +.09	38.6 3.8	10.91 +.06	63.2 3.8	57.56 .13	54.7 1.0	49.77 .26	53.4 2.4
15.9	11.52 .18	34.8 3.8	11.03 .18	59.3 3.8	57.72 .18	55.8 1.1	50.10 .38	51.1 2.2
25.9	11.75 .27	31.1 3.6	11.27 .30	55.6 3.6	57.92 .22	57.0 1.3	50.53 .49	49.0 1.9
35.9	12.05 +.35	27.6 -3.3	11.62 +.40	52.1 -3.3	58.16 +.25	58.3 +1.3	51.07 +.57	47.3 -1.5

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\eta$ Herculis.		$\kappa$ Ophiuchi.		$d$ Herculis.		$\epsilon$ Ursæ Minoris.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 16 38	<sup>m</sup> 39 10	<sup>h</sup> 16 51	<sup>m</sup> 9 34	<sup>h</sup> 16 56	<sup>m</sup> 33 45	<sup>h</sup> 16 59	<sup>m</sup> 82 14
Jan. 0.9	22.24 +.23	23.5 -3.2	26.20 +.20	56.1 -2.2	44.03 +.20	37.1 -3.1	20.57 +.57	53.7 -3.5
10.9	22.49 .27	20.4 3.0	26.43 .34	54.0 2.1	44.26 .24	34.1 2.9	21.28 .85	50.4 3.1
20.9	22.78 .30	17.6 2.6	26.68 .28	51.9 2.0	44.52 .28	31.3 2.6	22.27 1.11	47.5 2.7
30.8	23.09 .32	15.2 2.2	26.95 .28	50.1 1.7	44.81 .30	28.8 2.2	23.49 1.32	44.9 2.3
Feb. 9.8	23.43 .34	13.2 1.7	27.24 .29	48.5 1.4	45.12 .32	26.8 1.8	24.91 1.49	42.9 1.7
19.8	23.77 .35	11.8 1.1	27.53 .29	47.2 1.1	45.44 .33	25.3 1.2	26.47 1.60	41.5 1.1
Mar. 1.8	24.12 .34	11.0 -0.5	27.82 .29	46.3 0.7	45.77 .33	24.4 0.7	28.10 1.65	40.8 -0.4
11.7	24.46 .33	10.9 +0.1	28.11 .28	45.8 -0.3	46.09 .32	24.0 -0.1	29.76 1.63	40.7 +0.2
21.7	24.79 .32	11.3 0.7	28.39 .27	45.7 +0.1	46.40 .30	24.2 +0.5	31.37 1.56	41.3 0.9
31.7	25.09 .29	12.3 1.3	28.65 .26	46.0 0.5	46.70 .29	25.0 1.0	32.88 1.44	42.5 1.5
Apr. 10.7	25.37 .26	13.8 1.7	28.90 .24	46.6 0.8	46.98 .27	26.2 1.5	34.24 1.26	44.2 2.0
20.6	25.62 .23	15.7 2.1	29.13 .22	47.6 1.1	47.23 .24	28.0 1.9	35.40 1.05	46.4 2.4
30.6	25.83 .19	18.0 2.4	29.34 .19	48.8 1.3	47.45 .21	30.0 2.2	36.33 .80	49.0 2.7
May 10.6	26.01 .15	20.6 2.7	29.52 .17	50.2 1.5	47.64 .17	32.4 2.5	37.01 .54	51.9 3.0
20.5	26.14 .11	23.3 2.8	29.67 .14	51.7 1.6	47.79 .13	34.9 2.6	37.42 +.26	55.0 3.1
30.5	26.23 .07	26.1 2.8	29.79 .11	53.4 1.6	47.91 .10	37.6 2.7	37.54 -0.02	58.2 3.2
June 9.5	26.28 +.03	28.9 2.7	29.88 .07	55.0 1.6	47.99 .06	40.3 2.6	37.37 .30	61.3 3.1
19.5	26.29 -0.02	31.6 2.6	29.93 +.04	56.6 1.6	48.02 +.01	42.9 2.5	36.93 .57	64.4 2.9
29.4	26.24 .06	34.1 2.4	29.95 .00	58.1 1.5	48.01 -0.03	45.4 2.4	36.23 .89	67.2 2.7
July 9.4	26.16 .10	36.4 2.1	29.94 -0.04	59.6 1.3	47.96 .07	47.7 2.2	35.29 1.06	69.8 2.4
19.4	26.04 .14	38.3 1.8	29.88 .07	60.8 1.2	47.86 .11	49.7 1.9	34.12 1.26	72.0 2.0
29.4	25.87 .18	40.0 1.5	29.80 .10	61.9 1.0	47.73 .15	51.4 1.5	32.77 1.43	73.8 1.6
Aug. 8.3	25.68 .21	41.2 1.0	29.68 .13	62.8 0.8	47.57 .18	52.8 1.2	31.25 1.58	75.2 1.2
18.3	25.46 .23	42.1 0.6	29.53 .15	63.4 0.5	47.37 .21	53.8 0.8	29.61 1.69	76.3 0.7
28.3	25.22 .25	42.5 +0.2	29.37 .17	63.8 0.3	47.16 .22	54.4 +0.4	27.88 1.76	76.6 +0.2
Sept. 7.2	24.97 .25	42.4 -0.3	29.19 .18	64.0 +0.1	46.93 .23	54.5 0.0	26.10 1.79	76.6 -0.3
17.2	24.71 .25	42.0 0.7	29.01 .18	63.9 -0.2	46.69 .23	54.3 -0.5	24.31 1.78	76.0 0.8
27.2	24.47 .24	41.0 1.2	28.83 .17	63.6 0.5	46.46 .22	53.6 0.9	22.54 1.72	75.0 1.3
Oct. 7.2	24.24 .21	39.6 1.6	28.67 .15	63.0 0.7	46.25 .20	52.5 1.3	20.86 1.63	73.4 1.8
17.1	24.05 .18	37.8 2.0	28.53 .12	62.1 1.0	46.05 .17	51.0 1.7	19.29 1.49	71.4 2.2
27.1	23.89 .14	35.6 2.4	28.42 .09	61.0 1.3	45.90 .14	49.0 2.1	17.87 1.31	69.0 2.6
Nov. 6.1	23.78 .09	33.0 2.8	28.35 -0.05	59.6 1.5	45.78 .09	46.7 2.5	16.66 1.09	66.2 3.0
16.1	23.72 -0.03	30.0 3.0	28.33 .00	58.0 1.7	45.72 -0.04	44.1 2.8	15.68 .84	63.0 3.3
26.0	23.71 +0.03	26.9 3.2	28.35 +0.05	56.1 1.9	45.70 +0.02	41.2 3.0	14.97 .56	59.6 3.5
Dec. 6.0	23.77 .09	23.5 3.4	28.43 .10	54.1 2.1	45.75 .07	38.1 3.2	14.56 -0.28	56.0 3.6
16.0	23.89 .15	20.1 3.4	28.55 .14	52.0 2.2	45.84 .12	34.9 3.2	14.45 +0.05	52.3 3.7
25.9	24.06 .20	16.7 3.3	28.72 .19	49.7 2.2	46.00 .17	31.6 3.2	14.66 .37	48.7 3.6
35.9	24.29 +.25	13.4 -3.1	28.92 +.22	47.5 -2.2	46.19 +.22	28.5 -3.0	15.18 +.67	45.2 -3.4

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha^1$ Herculis.		$\delta$ Ophiuchi (44).		$\beta$ Draconis.		$\alpha$ Ophiuchi.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 17 <sup>m</sup> 8	<sup>°</sup> 14 <sup>'</sup> 32'	<sup>h</sup> 17 <sup>m</sup> 18	<sup>°</sup> 24 <sup>'</sup> 2'	<sup>h</sup> 17 <sup>m</sup> 27	<sup>°</sup> 52 <sup>'</sup> 23'	<sup>h</sup> 17 <sup>m</sup> 28	<sup>°</sup> 12 <sup>'</sup> 39'
Jan. 0.9	38.57 +.19	35.8 -2.4	20.14 +.22	57.3 +0.3	25.85 +.18	59.3 -3.6	49.28 +.17	33.4 -2.4
10.9	38.78 .29	33.4 2.3	20.37 .25	57.6 0.4	26.06 .24	55.8 3.4	49.48 .21	31.1 2.2
20.9	39.02 .25	31.2 2.1	20.64 .28	58.1 0.5	26.32 .29	52.6 3.1	49.70 .24	28.9 2.1
30.8	39.28 .27	29.2 1.9	20.93 .30	58.6 0.5	26.64 .34	49.7 2.6	49.95 .26	26.9 1.8
Feb. 9.8	39.56 .29	27.5 1.5	21.24 .31	59.1 0.5	26.99 .37	47.3 2.1	50.22 .28	25.2 1.5
19.8	39.85 .29	26.1 1.2	21.56 .32	59.6 0.5	27.38 .40	45.5 1.5	50.50 .28	23.9 1.2
Mar. 1.8	40.14 .29	25.2 0.7	21.88 .32	60.1 0.5	27.78 .41	44.2 0.9	50.79 .29	22.9 0.8
11.7	40.43 .29	24.7 -0.3	22.20 .32	60.6 0.4	28.19 .41	43.6 -0.3	51.08 .29	22.3 -0.4
21.7	40.72 .28	24.6 +0.1	22.52 .31	61.0 0.4	28.60 .40	43.7 +0.4	51.36 .28	22.2 +0.1
31.7	40.99 .27	25.0 0.6	22.82 .30	61.3 0.3	29.00 .38	44.5 1.0	51.64 .27	22.5 0.5
Apr. 10.7	41.25 .25	25.7 0.9	23.12 .29	61.6 0.3	29.37 .36	45.8 1.6	51.91 .26	21.2 0.8
20.6	41.49 .23	26.8 1.3	23.39 .27	61.8 0.2	29.71 .32	47.6 2.1	52.16 .24	24.2 1.2
30.6	41.71 .21	28.2 1.5	23.65 .25	62.0 0.2	30.01 .28	50.0 2.5	52.39 .22	25.5 1.5
May 10.6	41.91 .18	29.9 1.7	23.89 .22	62.2 0.2	30.27 .23	52.7 2.8	52.60 .20	27.1 1.7
20.5	42.07 .15	31.7 1.9	24.10 .19	62.3 0.2	30.47 .18	55.6 3.0	52.79 .17	28.8 1.8
30.5	42.21 .12	33.6 1.9	24.27 .16	62.5 0.2	30.62 .12	58.7 3.2	52.94 .14	30.6 1.9
June 9.5	42.31 .09	35.5 1.9	24.41 .12	62.7 0.2	30.72 +.06	61.9 3.2	53.07 .11	32.5 1.9
19.5	42.38 .05	37.4 1.9	24.52 .09	62.9 0.2	30.75 .00	65.1 3.1	53.16 .07	34.4 1.8
29.4	42.41 +.01	39.2 1.8	24.59 +.04	63.1 0.2	30.73 -.05	68.1 3.0	53.20 +.03	36.2 1.7
July 9.4	42.40 -.03	40.9 1.6	24.61 .00	63.3 0.2	30.64 .11	71.0 2.7	53.21 -.01	37.9 1.6
19.4	42.35 .06	42.4 1.4	24.59 -.04	63.5 0.2	30.50 .17	73.6 2.4	53.19 .05	39.4 1.4
29.4	42.27 .10	43.7 1.2	24.53 .08	63.7 0.2	30.31 .22	75.8 2.1	53.12 .08	40.7 1.2
Aug. 8.3	42.15 .13	44.8 0.9	24.43 .12	63.9 0.2	30.06 .26	77.7 1.7	53.02 .12	41.8 1.0
18.3	42.01 .16	45.6 0.7	24.29 .15	64.1 0.1	29.78 .30	79.2 1.2	52.88 .15	42.7 0.7
28.3	41.84 .18	46.2 0.4	24.13 .17	64.2 +0.1	29.46 .33	80.1 0.7	52.72 .17	43.3 0.5
Sept. 7.2	41.66 .19	46.4 +0.1	23.95 .18	64.2 0.0	29.12 .35	80.6 +0.3	52.55 .18	43.6 +0.2
17.2	41.47 .19	46.4 -0.2	23.76 .19	64.1 -0.1	28.77 .35	80.6 -0.3	52.36 .19	43.7 -0.1
27.2	41.28 .18	46.1 0.5	23.57 .18	64.0 0.2	28.42 .35	80.1 0.7	52.17 .18	43.5 0.4
Oct. 7.2	41.11 .17	45.4 0.8	23.40 .17	63.8 0.2	28.08 .33	79.2 1.3	51.99 .17	42.9 0.7
17.1	40.95 .14	44.5 1.1	23.24 .14	63.6 0.2	27.76 .30	77.6 1.7	51.83 .15	42.2 1.0
27.1	40.83 .11	43.2 1.4	23.12 .10	63.4 0.2	27.48 .26	75.6 2.2	51.69 .12	41.1 1.3
Nov. 6.1	40.74 .07	41.7 1.7	23.04 .06	63.1 0.2	27.24 .21	73.2 2.6	51.59 .08	39.7 1.5
16.1	40.70 -.02	39.9 1.9	23.01 -.01	62.9 -0.2	27.07 .15	70.3 3.0	51.54 -.04	38.1 1.7
26.0	40.70 +.03	37.9 2.1	23.02 +.04	62.8 -0.1	26.95 .08	67.2 3.3	51.52 +.01	36.2 2.0
Dec. 6.0	40.75 .08	35.6 2.3	23.09 .10	62.7 0.0	26.91 -.01	63.7 3.6	51.56 .06	34.1 2.2
16.0	40.85 .12	33.3 2.4	23.22 .15	62.8 +0.1	26.94 +.06	60.1 3.6	51.64 .11	31.9 2.3
25.9	41.00 .17	30.8 2.4	23.39 .19	63.0 0.2	27.04 .13	56.5 3.6	51.77 .15	29.6 2.3
35.9	41.19 +.20	28.4 -2.4	23.60 +.22	63.3 +0.3	27.20 +.20	52.9 -3.5	51.94 +.18	27.3 -2.2

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	* $\omega$ Draconis.		$\mu$ Herculis.		* $\psi^1$ Draconis (pr.).		$\gamma$ Draconis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 17 37	<sup>m</sup> 68° 48'	<sup>h</sup> 17 41	<sup>m</sup> 27° 47'	<sup>h</sup> 17 44	<sup>m</sup> 72° 12'	<sup>h</sup> 17 53	<sup>m</sup> 51° 30'
Jan. 1.0	<sup>s</sup> 39.60 +.18	<sup>"</sup> 65.9 -3.7	<sup>s</sup> 17.92 +.16	<sup>"</sup> 60.1 -3.0	<sup>s</sup> 12.19 +.17	<sup>"</sup> 47.1 -3.7	<sup>s</sup> 31.58 +.13	<sup>"</sup> 22.2 -3.6
10.9	39.83 .39	62.3 3.5	18.10 .19	57.2 2.8	12.43 .30	43.5 3.5	31.79 .20	18.7 3.4
20.9	40.18 .39	59.0 3.9	18.31 .23	54.5 2.6	12.80 .49	40.1 3.2	31.94 .25	15.4 3.2
30.9	40.61 .48	56.0 2.7	18.55 .26	52.0 2.3	13.28 .53	37.1 2.8	32.23 .30	12.4 2.8
Feb. 9.8	41.13 .55	53.5 2.2	18.82 .28	49.8 1.9	13.86 .02	34.5 2.3	32.55 .34	9.8 2.3
19.8	41.71 .60	51.6 1.6	19.11 .30	48.1 1.5	14.52 .09	32.5 1.7	32.90 .37	7.7 1.8
Mar. 1.8	42.34 .63	50.2 1.0	19.41 .30	46.9 1.0	15.24 .73	31.1 1.1	33.29 .39	6.2 1.9
11.8	42.98 .65	49.6 -0.3	19.72 .30	46.2 -0.4	15.99 .75	30.3 -0.4	33.69 .40	5.4 -0.5
21.7	43.63 .64	49.6 +0.4	20.02 .30	46.1 +0.1	16.74 .75	30.3 +0.3	34.09 .40	5.2 +0.1
31.7	44.26 .61	50.3 1.0	20.32 .29	46.5 0.6	17.48 .79	30.9 0.9	34.48 .39	5.6 0.8
Apr. 10.7	44.85 .56	51.6 1.6	20.61 .28	47.4 1.1	18.17 .86	32.1 1.5	34.86 .37	6.7 1.4
20.7	45.38 .50	53.5 2.1	20.88 .26	48.7 1.5	18.81 .59	33.9 2.0	35.22 .34	8.3 1.9
30.6	45.85 .43	55.8 2.6	21.13 .24	50.5 1.9	19.36 .51	36.2 2.5	35.54 .30	10.5 2.3
May 10.6	46.24 .34	58.6 2.9	21.35 .21	52.5 2.2	19.82 .41	38.8 2.8	35.83 .26	13.0 2.7
20.6	46.54 .25	61.6 3.1	21.55 .18	54.9 2.4	20.17 .30	41.8 3.1	36.07 .21	15.8 3.0
30.5	46.74 .15	64.8 3.3	21.71 .14	57.3 2.5	20.41 .18	45.0 3.2	36.25 .16	18.9 3.1
June 9.5	46.84 +.05	68.2 3.3	21.84 .11	59.9 2.5	20.53 +.06	48.3 3.3	36.39 .10	22.1 3.2
19.5	46.84 -0.05	71.5 3.3	21.92 .06	62.4 2.5	20.52 -0.07	51.6 3.3	36.46 +.04	25.3 3.2
29.5	46.74 .15	74.7 3.1	21.96 +.02	64.9 2.4	20.39 .19	54.8 3.1	36.47 -0.02	28.5 3.1
July 9.4	46.53 .25	77.7 2.9	21.96 -0.02	67.2 2.2	20.15 .30	57.8 2.9	36.43 .08	31.5 2.9
19.4	46.23 .34	80.4 2.6	21.92 .06	69.3 2.0	19.79 .41	60.6 2.6	36.32 .13	34.3 2.6
29.4	45.85 .42	82.9 2.2	21.84 .10	71.2 1.7	19.33 .51	63.1 2.3	36.16 .19	36.8 2.3
Aug. 8.4	45.39 .50	84.9 1.8	21.71 .14	72.8 1.4	18.78 .59	65.1 1.9	35.95 .24	38.9 1.9
18.3	44.86 .56	86.5 1.4	21.56 .17	74.0 1.1	18.15 .06	66.8 1.4	35.69 .28	40.6 1.5
28.3	44.28 .60	87.6 0.9	21.37 .20	74.9 0.7	17.45 .72	68.0 1.0	35.40 .21	42.0 1.1
Sept. 7.3	43.66 .63	88.3 +0.4	21.16 .21	75.5 +0.3	16.71 .75	68.7 +0.5	35.07 .23	42.8 0.6
17.2	43.02 .64	88.4 -0.1	20.95 .22	75.6 -0.1	15.94 .77	68.9 -0.1	34.73 .25	43.2 +0.1
27.2	42.37 .64	88.0 0.7	20.72 .22	75.4 0.4	15.17 .77	68.6 0.6	34.38 .25	43.0 -0.4
Oct. 7.2	41.74 .61	87.1 1.2	20.51 .21	74.7 0.8	14.40 .75	67.7 1.1	34.04 .24	42.3 0.9
17.2	41.14 .57	85.6 1.7	20.31 .19	73.7 1.2	13.68 .70	66.4 1.6	33.71 .21	41.1 1.4
27.1	40.60 .51	83.6 2.2	20.14 .16	72.2 1.6	13.01 .63	64.5 2.1	33.41 .26	39.5 1.9
Nov. 6.1	40.12 .44	81.2 2.6	20.00 .12	70.4 2.0	12.41 .55	62.1 2.6	33.16 .23	37.3 2.4
16.1	39.73 .35	78.4 3.0	19.91 .07	68.3 2.3	11.91 .44	59.3 3.0	32.96 .17	34.7 2.8
26.1	39.43 .24	75.1 3.3	19.86 -0.02	65.8 2.6	11.52 .38	56.2 3.3	32.81 .11	31.8 3.1
Dec. 6.0	39.24 .13	71.7 3.6	19.86 +0.03	63.1 2.8	11.26 .19	52.7 3.5	32.73 -0.05	28.5 3.4
16.0	39.17 -0.01	68.0 3.7	19.91 .08	60.2 2.9	11.13 -0.06	49.1 3.7	32.72 +0.02	25.1 3.5
26.0	39.22 +.11	64.3 3.7	20.02 .13	57.3 3.0	11.15 +0.08	45.4 3.7	32.78 .09	21.5 3.6
35.9	39.38 +.23	60.6 -3.6	20.16 +.17	54.3 -3.0	11.30 +.22	41.7 -3.7	32.91 +.16	17.9 -3.6



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma^a$ Sagittarii.		$\sigma^b$ Octantis.		$\mu^c$ Sagittarii.	
	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 17 57	<sup>m</sup> 30 25	<sup>h</sup> 18	<sup>m</sup> 89 16	<sup>h</sup> 18 5	<sup>m</sup> 21 5
Jan. 1.0	21.23 +.19	14.0 -0.3	2 19.16 + 7.31	32.7 -3.1	53.53 +.17	18.4 +0.2
10.9	21.44 .33	13.7 0.2	2 27.99 10.34	29.7 2.9	53.72 .30	18.6 0.3
20.9	21.69 .36	13.6 0.1	2 29.71 13.04	26.9 2.6	53.94 .34	19.0 0.3
30.9	21.96 .39	13.5 -0.1	2 53.96 15.38	24.4 2.3	54.19 .36	19.3 0.3
Feb. 9.9	22.26 .31	13.5 0.0	3 10.32 17.27	22.4 1.8	54.46 .38	19.6 0.3
19.8	22.58 .33	13.5 0.0	3 28.36 18.71	20.7 1.4	54.75 .30	19.9 0.3
Mar. 1.8	22.91 .33	13.6 +0.1	3 47.59 19.67	19.6 0.9	55.05 .31	20.1 0.2
11.8	23.24 .34	13.7 0.1	4 7.56 20.19	18.9 -0.4	55.36 .31	20.2 +0.1
21.7	23.58 .34	13.8 0.1	4 27.84 20.27	18.8 +0.1	55.67 .31	20.3 0.0
31.7	23.92 .33	13.9 0.1	4 47.96 19.92	19.1 0.6	55.98 .31	20.3 -0.1
Apr. 10.7	24.24 .33	14.0 0.1	5 7.55 19.18	19.9 1.0	56.29 .30	20.1 0.2
20.7	24.56 .31	14.1 0.2	5 26.18 18.01	21.2 1.5	56.58 .29	19.9 0.2
30.6	24.86 .39	14.3 0.2	5 43.46 16.50	22.8 1.9	56.86 .27	19.7 0.2
May 10.6	25.14 .37	14.5 0.2	5 59.06 14.64	24.9 2.3	57.13 .25	19.5 0.3
20.6	25.39 .34	14.7 0.3	6 12.64 12.49	27.4 2.6	57.37 .23	19.2 0.2
30.6	25.62 .31	15.0 0.4	6 23.93 10.03	30.0 2.8	57.59 .20	19.0 0.2
June 9.5	25.81 .17	15.4 0.4	6 32.62 7.33	33.0 3.0	57.78 .17	18.8 0.2
19.5	25.96 .13	15.9 0.5	6 38.53 4.46	36.1 3.1	57.93 .13	18.7 -0.1
29.5	26.07 .09	16.4 0.5	6 41.51 + 1.47	39.2 3.2	58.03 .09	18.6 0.0
July 9.4	26.13 +.04	17.0 0.6	6 41.46 - 1.56	42.4 3.1	58.10 +.04	18.6 0.0
19.4	26.15 -.01	17.6 0.6	6 38.40 4.60	45.4 3.0	58.12 .00	18.6 +0.1
29.4	26.11 .05	18.1 0.6	6 32.35 7.45	48.3 2.7	58.10 -.04	18.8 0.1
Aug. 8.4	26.04 .10	18.7 0.5	6 23.57 10.10	50.9 2.4	58.04 .08	18.9 0.2
18.3	25.92 .14	19.2 0.5	6 12.26 12.41	53.1 2.0	57.93 .12	19.1 0.2
28.3	25.77 .17	19.6 0.4	5 58.88 14.30	54.9 1.5	57.80 .15	19.3 0.2
Sept. 7.3	25.58 .19	19.9 0.3	5 43.83 15.70	56.2 1.0	57.63 .17	19.4 0.1
17.3	25.39 .20	20.1 +0.1	5 27.68 16.49	57.0 +0.4	57.45 .19	19.6 0.1
27.2	25.18 .20	20.2 0.0	5 11.04 16.66	57.1 -0.2	57.26 .19	19.6 +0.1
Oct. 7.2	24.99 .19	20.1 -0.1	4 54.56 16.20	56.6 0.8	57.08 .18	19.7 0.0
17.2	24.80 .17	19.9 0.3	4 38.86 15.08	55.6 1.3	56.91 .16	19.7 0.0
27.1	24.65 .14	19.6 0.4	4 24.62 13.30	54.0 1.9	56.76 .13	19.7 0.0
Nov. 6.1	24.53 .09	19.2 0.4	4 12.44 10.98	51.9 2.3	56.65 .09	19.7 0.0
16.1	24.46 -.05	18.8 0.5	4 2.82 8.15	49.3 2.7	56.58 -.05	19.7 0.0
26.1	24.44 +.01	18.3 0.5	3 56.24 5.00	46.5 3.0	56.55 .00	19.8 +0.1
Dec. 6.0	24.47 .06	17.8 0.4	3 52.88 - 1.65	43.3 3.2	56.57 +.05	19.8 0.1
16.0	24.56 .11	17.4 0.4	3 52.95 + 1.82	40.1 3.2	56.64 .10	20.0 0.2
26.0	24.69 .16	17.1 0.3	3 56.48 5.18	36.9 3.2	56.77 .14	20.2 0.2
36.0	24.88 +.20	16.8 -0.2	4 3.23 + 8.26	33.7 -3.1	56.93 +.18	20.4 +0.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\eta$ Serpentis.		1 Aquilæ. (3 H. Scuti Sob.)		$\alpha$ Lyrae. (Vega.)		$\beta$ Lyrae.	
	Right Ascension.	Declination South.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 18 <sup>m</sup> 14	<sup>°</sup> 2 <sup>'</sup> 55	<sup>h</sup> 18 <sup>m</sup> 28	<sup>°</sup> 8 <sup>'</sup> 19	<sup>h</sup> 18 <sup>m</sup> 32	<sup>°</sup> 38 <sup>'</sup> 39	<sup>h</sup> 18 <sup>m</sup> 45	<sup>°</sup> 33 <sup>'</sup> 12
Jan. 1.0	29.81 +.14	44.2 +1.4	2.55 +.13	54.7 +1.0	28.06 +.09	53.2 -3.2	12.56 +.08	48.4 +3.0
10.9	29.97 .18	45.6 1.4	2.70 .17	55.7 1.0	28.17 .14	50.0 3.2	12.66 .19	45.4 3.0
20.9	30.16 .20	46.9 1.3	2.89 .20	56.6 0.9	28.34 .18	46.9 3.0	12.81 .17	42.5 2.8
30.9	30.38 .23	48.2 1.2	3.10 .23	57.6 0.9	28.54 .23	44.0 2.7	12.99 .21	39.7 2.6
Feb. 9.9	30.63 .25	49.3 1.0	3.34 .25	58.4 0.7	28.79 .26	41.4 2.4	13.22 .24	37.3 2.3
19.8	30.89 .27	50.2 0.8	3.60 .27	59.0 0.6	29.06 .29	39.3 1.9	13.47 .26	35.2 1.9
Mar. 1.8	31.16 .28	50.8 0.5	3.87 .28	59.5 0.4	29.36 .31	37.6 1.4	13.75 .29	33.6 1.4
11.8	31.44 .28	51.2 +0.3	4.15 .29	59.7 +0.2	29.68 .32	36.5 0.8	14.04 .30	32.5 0.8
21.8	31.73 .29	51.4 0.0	4.44 .29	59.8 -0.1	30.01 .33	36.0 -0.3	14.35 .31	31.9 -0.3
31.7	32.01 .28	51.2 -0.3	4.73 .29	59.6 0.3	30.34 .33	36.1 +0.4	14.67 .32	31.9 +0.3
Apr. 10.7	32.29 .28	50.8 0.5	5.02 .29	59.2 0.5	30.67 .33	36.8 1.0	14.98 .31	32.5 0.8
20.7	32.57 .27	50.2 0.8	5.31 .28	58.6 0.7	30.99 .31	38.1 1.5	15.29 .30	33.6 1.3
30.6	32.83 .26	49.3 0.9	5.58 .27	57.9 0.8	31.30 .29	39.8 1.9	15.59 .29	35.2 1.8
May 10.6	33.08 .24	48.3 1.1	5.84 .25	57.0 0.9	31.58 .27	41.9 2.3	15.87 .27	37.2 2.2
20.6	33.30 .21	47.2 1.2	6.08 .23	56.1 1.0	31.83 .24	44.4 2.6	16.12 .24	39.5 2.5
30.6	33.51 .19	46.0 1.2	6.30 .20	55.1 1.0	32.05 .20	47.2 2.8	16.35 .21	42.1 2.7
June 9.5	33.68 .16	44.8 1.2	6.49 .17	54.1 1.0	32.23 .16	50.1 3.0	16.54 .17	44.9 2.8
19.5	33.82 .12	43.7 1.2	6.65 .14	53.2 0.9	32.36 .11	53.1 3.0	16.69 .13	47.7 2.8
29.5	33.92 .08	42.5 1.1	6.77 .10	52.3 0.8	32.45 .06	56.1 3.0	16.79 .08	50.6 2.8
July 9.5	33.98 +.04	41.5 1.0	6.84 .06	51.5 0.7	32.48 +.01	59.0 2.8	16.85 +.03	53.4 2.7
19.4	34.00 .00	40.6 0.9	6.88 +.02	50.9 0.6	32.47 -.04	61.8 2.7	16.85 -.02	56.0 2.6
29.4	33.98 -.04	39.8 0.7	6.88 -.03	50.3 0.5	32.40 .09	64.4 2.4	16.82 .06	58.5 2.3
Aug. 8.4	33.92 .08	39.1 0.6	6.83 .07	49.9 0.4	32.29 .13	66.6 2.1	16.73 .11	60.7 2.1
18.3	33.82 .11	38.6 0.4	6.74 .10	49.6 0.3	32.13 .18	68.6 1.8	16.60 .15	62.6 1.7
28.3	33.69 .14	38.3 0.3	6.62 .13	49.4 0.2	31.94 .21	70.1 1.4	16.44 .18	64.1 1.4
Sept. 7.3	33.54 .16	38.1 -0.2	6.48 .16	49.3 -0.1	31.71 .24	71.3 1.0	16.24 .21	65.3 1.0
17.3	33.37 .18	38.0 0.0	6.31 .17	49.3 +0.1	31.47 .25	72.0 0.5	16.02 .23	66.1 0.6
27.2	33.19 .18	38.1 +0.2	6.13 .18	49.4 0.2	31.21 .26	72.3 +0.1	15.78 .24	66.5 +0.2
Oct. 7.2	33.01 .17	38.3 0.3	5.95 .17	49.6 0.2	30.94 .26	72.2 -0.4	15.54 .24	66.4 -0.3
17.2	32.84 .16	38.7 0.4	5.78 .16	49.9 0.3	30.69 .25	71.5 0.9	15.31 .23	65.9 0.7
27.2	32.69 .13	39.2 0.6	5.63 .14	50.2 0.4	30.45 .28	70.4 1.3	15.09 .20	65.0 1.2
Nov. 6.1	32.58 .10	39.9 0.8	5.51 .10	50.7 0.5	30.24 .19	68.9 1.8	14.90 .18	63.6 1.6
16.1	32.50 .06	40.7 0.9	5.43 .07	51.3 0.6	30.08 .15	66.9 2.2	14.74 .14	61.8 2.0
26.1	32.46 -.02	41.7 1.0	5.38 -.02	52.0 0.7	29.95 .10	64.5 2.5	14.62 .10	59.7 2.3
Dec. 6.0	32.46 +.03	42.8 1.2	5.38 +.02	52.8 0.8	29.88 -.05	61.8 2.8	14.55 -.05	57.2 2.6
16.0	32.51 .07	44.0 1.3	5.42 .07	53.6 0.9	29.85 .00	58.8 3.1	14.52 .00	54.5 2.8
26.0	32.61 .12	45.3 1.3	5.51 .11	54.6 1.0	29.88 +.06	55.7 3.2	14.55 +.05	51.5 3.0
36.0	32.75 +.16	46.7 +1.4	5.64 +.15	55.6 +1.0	29.97 +.11	52.5 -3.2	14.62 +.10	48.5 -3.0

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\sigma$ Sagittarii.		*50 Draconis.		$\zeta$ Aquilæ.		$d$ Sagittarii.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 18 47	<sup>m</sup> 26 27	<sup>h</sup> 18 50	<sup>m</sup> 75 16	<sup>h</sup> 18 59	<sup>m</sup> 13 40	<sup>h</sup> 19 9	<sup>m</sup> 19 10
Jan. 1.0	6.12 +.13	18.2 -0.3	30.49 -0.08	46.5 -3.6	21.31 +.09	20.5 -2.1	55.94 +.10	57.6 +0.3
11.0	6.27 .17	18.0 0.3	30.50 +.09	42.9 3.6	21.42 .12	18.3 2.1	56.06 .14	57.8 0.3
20.9	6.46 .31	17.8 0.3	30.68 .26	39.4 3.5	21.55 .16	16.2 2.0	56.21 .17	57.9 0.1
30.9	6.68 .34	17.6 0.3	31.01 .41	36.0 3.2	21.73 .19	14.3 1.8	56.40 .21	58.0 +0.1
Feb. 9.9	6.93 .36	17.4 0.3	31.50 .55	32.9 2.9	21.93 .21	12.6 1.6	56.62 .23	58.0 0.0
19.9	7.21 .38	17.2 0.3	32.11 .67	30.3 2.4	22.16 .24	11.1 1.3	56.86 .25	58.0 -0.1
Mar. 1.8	7.50 .30	17.0 0.3	32.83 .76	28.1 1.9	22.40 .26	10.0 0.9	57.13 .27	57.9 0.3
11.8	7.81 .31	16.7 0.3	33.63 .83	26.5 1.3	22.67 .27	9.2 0.5	57.40 .29	57.7 0.3
21.8	8.13 .32	16.4 0.3	34.40 .87	25.6 -0.6	22.94 .28	8.9 -0.1	57.70 .30	57.3 0.4
31.8	8.45 .32	16.0 0.4	35.37 .88	25.3 +0.1	23.23 .29	9.0 +0.3	58.00 .30	56.8 0.5
Apr. 10.7	8.77 .32	15.7 0.4	36.25 .86	25.7 0.7	23.52 .29	9.5 0.7	58.31 .31	56.3 0.6
20.7	9.10 .32	15.3 0.4	37.09 .81	26.7 1.3	23.80 .28	10.5 1.1	58.62 .31	55.6 0.7
30.7	9.41 .31	14.9 0.3	37.87 .74	28.3 1.8	24.08 .27	11.7 1.4	58.92 .30	54.9 0.7
May 10.6	9.71 .29	14.6 0.3	38.58 .65	30.4 2.3	24.35 .26	13.3 1.7	59.22 .29	54.2 0.7
20.6	10.00 .27	14.3 0.3	39.18 .54	33.0 2.7	24.60 .24	15.1 1.9	59.50 .27	53.5 0.7
30.6	10.26 .25	14.1 -0.1	39.65 .41	35.8 3.0	24.83 .21	17.1 2.0	59.76 .25	52.8 0.6
June 9.6	10.49 .21	14.0 0.0	40.00 .27	39.0 3.2	25.03 .18	19.2 2.1	60.00 .22	52.3 0.6
19.5	10.68 .18	14.0 +0.1	40.20 +.13	42.3 3.3	25.20 .15	21.3 2.1	60.20 .19	51.7 0.5
29.5	10.84 .13	14.2 0.3	40.26 -0.02	45.7 3.4	25.33 .11	23.4 2.1	60.37 .15	51.4 0.3
July 9.5	10.95 .09	14.4 0.3	40.16 .17	49.0 3.3	25.42 .07	25.4 2.0	60.50 .10	51.1 0.3
19.5	11.01 +.04	14.7 0.4	39.92 .31	52.3 3.2	25.47 +.03	27.3 1.8	60.58 .06	50.9 -0.1
29.4	11.03 -.01	15.1 0.4	39.55 .44	55.3 2.9	25.47 -.02	29.1 1.6	60.62 +.01	50.9 0.0
Aug. 8.4	11.00 .05	15.6 0.5	39.04 .57	58.1 2.7	25.43 .06	30.6 1.4	60.61 -.03	51.0 +0.1
18.4	10.92 .10	16.1 0.5	38.41 .68	60.6 2.3	25.36 .10	31.9 1.2	60.55 .07	51.1 0.3
28.3	10.80 .13	16.5 0.5	37.68 .77	62.8 1.9	25.24 .13	33.0 0.9	60.46 .11	51.4 0.3
Sept. 7.3	10.65 .16	17.0 0.4	36.86 .85	64.5 1.5	25.09 .16	33.8 0.7	60.33 .14	51.7 0.3
17.3	10.48 .18	17.4 0.4	35.98 .91	65.7 1.0	24.92 .18	34.3 0.4	60.17 .17	52.0 0.3
27.3	10.29 .19	17.7 0.3	35.05 .94	66.4 +0.5	24.74 .19	34.6 +0.1	60.00 .18	52.3 0.3
Oct. 7.2	10.09 .19	17.9 0.3	34.10 .96	66.7 0.0	24.55 .19	34.5 -0.2	59.82 .18	52.6 0.3
17.2	9.91 .18	18.1 +0.1	33.16 .93	66.4 -0.6	24.36 .18	34.1 0.5	59.64 .17	52.9 0.3
27.2	9.73 .16	18.1 0.0	32.24 .89	65.5 1.1	24.19 .16	33.5 0.8	59.47 .16	53.1 0.2
Nov. 6.2	9.59 .12	18.1 -0.1	31.38 .82	64.1 1.7	24.04 .14	32.5 1.1	59.32 .13	53.3 0.2
16.1	9.49 .08	17.9 0.2	30.59 .73	62.2 2.1	23.91 .10	31.3 1.4	59.21 .10	53.5 0.2
26.1	9.42 -.04	17.7 0.2	29.91 .62	59.8 2.6	23.83 .07	29.8 1.6	59.13 .06	53.7 0.2
Dec. 6.1	9.41 +.01	17.5 0.2	29.35 .49	57.0 3.0	23.78 -.03	28.1 1.8	59.10 -.01	53.9 0.2
16.0	9.44 .06	17.3 0.2	28.94 .34	53.9 3.3	23.78 +.02	26.2 2.0	59.11 +.03	54.0 0.2
26.0	9.52 .10	17.0 0.2	28.68 .18	50.4 3.5	23.81 .06	24.1 2.1	59.16 .07	54.2 0.2
36.0	9.65 +.15	16.8 -0.2	28.58 -.01	46.9 -3.6	23.89 +.10	22.0 -2.2	59.26 +.11	54.4 +0.2

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	* $\delta$ Draconis.		* $\gamma$ Draconis.		$\delta$ Aquilæ.		$\alpha$ Aquilæ.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 19 <sup>m</sup> 12	<sup>°</sup> 67 <sup>'</sup> 25	<sup>h</sup> 19 <sup>m</sup> 17	<sup>°</sup> 73 <sup>'</sup> 6	<sup>h</sup> 19 <sup>m</sup> 18	<sup>°</sup> 2 <sup>'</sup> 51	<sup>h</sup> 19 <sup>m</sup> 29	<sup>°</sup> 7 <sup>'</sup> 18
Jan. 1.0	27.93 <sup>s</sup> -.06	59.1 <sup>"</sup> -3.6	59.52 <sup>s</sup> -.14	48.8 <sup>"</sup> -3.5	51.55 <sup>s</sup> +0.07	25.2 <sup>"</sup> -1.5	48.47 <sup>s</sup> +0.07	55.9 <sup>"</sup> +0.9
11.0	27.92 <sup>s</sup> +0.04	55.6 <sup>"</sup> 3.6	59.45 <sup>s</sup> .00	45.3 <sup>"</sup> 3.6	51.64 <sup>s</sup> .11	23.7 <sup>"</sup> 1.5	48.57 <sup>s</sup> .11	56.8 <sup>"</sup> 0.8
21.0	28.02 <sup>s</sup> .15	52.0 <sup>"</sup> 3.5	59.52 <sup>s</sup> +0.15	41.7 <sup>"</sup> 3.5	51.77 <sup>s</sup> .14	22.3 <sup>"</sup> 1.4	48.69 <sup>s</sup> .14	57.6 <sup>"</sup> 0.8
30.9	28.22 <sup>s</sup> .25	48.5 <sup>"</sup> 3.3	59.74 <sup>s</sup> .29	38.2 <sup>"</sup> 3.4	51.93 <sup>s</sup> .17	20.9 <sup>"</sup> 1.3	48.85 <sup>s</sup> .17	58.3 <sup>"</sup> 0.7
Feb. 9.9	28.52 <sup>s</sup> .35	45.3 <sup>"</sup> 3.0	60.09 <sup>s</sup> .41	35.0 <sup>"</sup> 3.3	52.12 <sup>s</sup> .20	19.7 <sup>"</sup> 1.1	49.03 <sup>s</sup> .20	59.0 <sup>"</sup> 0.5
19.9	28.91 <sup>s</sup> .43	42.5 <sup>"</sup> 2.6	60.56 <sup>s</sup> .53	32.1 <sup>"</sup> 2.6	52.33 <sup>s</sup> .22	18.7 <sup>"</sup> 0.9	49.24 <sup>s</sup> .22	59.4 <sup>"</sup> 0.4
Mar. 1.9	29.37 <sup>s</sup> .50	40.2 <sup>"</sup> 2.1	61.14 <sup>s</sup> .62	29.7 <sup>"</sup> 2.1	52.57 <sup>s</sup> .24	18.0 <sup>"</sup> 0.6	49.48 <sup>s</sup> .24	59.7 <sup>"</sup> +0.3
11.8	29.90 <sup>s</sup> .55	38.4 <sup>"</sup> 1.5	61.80 <sup>s</sup> .69	27.8 <sup>"</sup> 1.6	52.82 <sup>s</sup> .26	17.6 <sup>"</sup> -0.3	49.73 <sup>s</sup> .26	59.8 <sup>"</sup> -0.1
21.8	30.47 <sup>s</sup> .58	37.2 <sup>"</sup> 0.8	62.53 <sup>s</sup> .74	26.6 <sup>"</sup> 0.9	53.09 <sup>s</sup> .27	17.5 <sup>"</sup> +0.1	50.00 <sup>s</sup> .28	59.6 <sup>"</sup> 0.3
31.8	31.07 <sup>s</sup> .60	36.7 <sup>"</sup> -0.2	63.29 <sup>s</sup> .77	25.9 <sup>"</sup> -0.3	53.37 <sup>s</sup> .28	17.7 <sup>"</sup> 0.4	50.28 <sup>s</sup> .28	59.2 <sup>"</sup> 0.5
Apr. 10.8	31.67 <sup>s</sup> .60	36.9 <sup>"</sup> +0.5	64.07 <sup>s</sup> .77	26.0 <sup>"</sup> +0.4	53.65 <sup>s</sup> .29	18.2 <sup>"</sup> 0.7	50.57 <sup>s</sup> .29	58.6 <sup>"</sup> 0.7
20.7	32.27 <sup>s</sup> .58	37.6 <sup>"</sup> 1.1	64.83 <sup>s</sup> .75	26.6 <sup>"</sup> 1.0	53.94 <sup>s</sup> .29	19.1 <sup>"</sup> 1.0	50.86 <sup>s</sup> .29	57.7 <sup>"</sup> 0.9
30.7	32.83 <sup>s</sup> .55	39.0 <sup>"</sup> 1.7	65.56 <sup>s</sup> .70	27.9 <sup>"</sup> 1.6	54.23 <sup>s</sup> .28	20.2 <sup>"</sup> 1.2	51.16 <sup>s</sup> .29	56.7 <sup>"</sup> 1.1
May 10.7	33.36 <sup>s</sup> .50	41.0 <sup>"</sup> 2.3	66.23 <sup>s</sup> .63	29.8 <sup>"</sup> 2.1	54.50 <sup>s</sup> .27	21.5 <sup>"</sup> 1.4	51.45 <sup>s</sup> .28	55.6 <sup>"</sup> 1.2
20.6	33.82 <sup>s</sup> .43	43.4 <sup>"</sup> 2.6	66.83 <sup>s</sup> .55	32.1 <sup>"</sup> 2.5	54.77 <sup>s</sup> .26	23.0 <sup>"</sup> 1.6	51.72 <sup>s</sup> .27	54.4 <sup>"</sup> 1.2
30.6	34.22 <sup>s</sup> .36	46.2 <sup>"</sup> 3.0	67.33 <sup>s</sup> .45	34.8 <sup>"</sup> 2.9	55.01 <sup>s</sup> .23	24.6 <sup>"</sup> 1.6	51.98 <sup>s</sup> .25	53.1 <sup>"</sup> 1.3
June 9.6	34.54 <sup>s</sup> .27	49.3 <sup>"</sup> 3.2	67.72 <sup>s</sup> .33	37.9 <sup>"</sup> 3.3	55.23 <sup>s</sup> .21	26.3 <sup>"</sup> 1.7	52.22 <sup>s</sup> .22	51.9 <sup>"</sup> 1.2
19.6	34.76 <sup>s</sup> .18	52.6 <sup>"</sup> 3.4	68.00 <sup>s</sup> .21	41.2 <sup>"</sup> 3.3	55.43 <sup>s</sup> .17	28.0 <sup>"</sup> 1.7	52.43 <sup>s</sup> .19	50.7 <sup>"</sup> 1.2
29.5	34.89 <sup>s</sup> +0.08	56.1 <sup>"</sup> 3.4	68.14 <sup>s</sup> +0.08	44.5 <sup>"</sup> 3.4	55.58 <sup>s</sup> .14	29.6 <sup>"</sup> 1.6	52.60 <sup>s</sup> .15	49.5 <sup>"</sup> 1.1
July 9.5	34.92 <sup>s</sup> -.02	59.5 <sup>"</sup> 3.4	68.16 <sup>s</sup> -.05	48.0 <sup>"</sup> 3.4	55.70 <sup>s</sup> .10	31.2 <sup>"</sup> 1.5	52.73 <sup>s</sup> .11	48.5 <sup>"</sup> 1.0
19.5	34.85 <sup>s</sup> .12	62.9 <sup>"</sup> 3.3	68.05 <sup>s</sup> .18	51.4 <sup>"</sup> 3.3	55.77 <sup>s</sup> .05	32.6 <sup>"</sup> 1.3	52.82 <sup>s</sup> .07	47.6 <sup>"</sup> 0.8
29.5	34.68 <sup>s</sup> .21	66.1 <sup>"</sup> 3.1	67.81 <sup>s</sup> .30	54.6 <sup>"</sup> 3.3	55.81 <sup>s</sup> +0.01	33.9 <sup>"</sup> 1.2	52.87 <sup>s</sup> +0.03	46.9 <sup>"</sup> 0.7
Aug. 8.4	34.42 <sup>s</sup> .30	69.1 <sup>"</sup> 2.9	67.45 <sup>s</sup> .42	57.7 <sup>"</sup> 2.9	55.79 <sup>s</sup> -.03	35.0 <sup>"</sup> 1.0	52.88 <sup>s</sup> -.02	46.3 <sup>"</sup> 0.5
18.4	34.07 <sup>s</sup> .38	71.9 <sup>"</sup> 2.6	66.98 <sup>s</sup> .52	60.5 <sup>"</sup> 2.6	55.74 <sup>s</sup> .07	35.9 <sup>"</sup> 0.8	52.84 <sup>s</sup> .06	45.9 <sup>"</sup> 0.4
28.4	33.65 <sup>s</sup> .46	74.2 <sup>"</sup> 2.2	66.41 <sup>s</sup> .61	63.0 <sup>"</sup> 2.3	55.65 <sup>s</sup> .11	36.6 <sup>"</sup> 0.6	52.76 <sup>s</sup> .10	45.6 <sup>"</sup> 0.2
Sept. 7.3	33.16 <sup>s</sup> .52	76.2 <sup>"</sup> 1.7	65.75 <sup>s</sup> .69	65.0 <sup>"</sup> 1.9	55.53 <sup>s</sup> .14	37.1 <sup>"</sup> 0.4	52.64 <sup>s</sup> .13	45.5 <sup>"</sup> -0.1
17.3	32.62 <sup>s</sup> .56	77.7 <sup>"</sup> 1.3	65.03 <sup>s</sup> .75	66.7 <sup>"</sup> 1.4	55.38 <sup>s</sup> .10	37.4 <sup>"</sup> +0.2	52.50 <sup>s</sup> .15	45.4 <sup>"</sup> 0.0
27.3	32.05 <sup>s</sup> .59	78.8 <sup>"</sup> 0.8	64.25 <sup>s</sup> .79	67.8 <sup>"</sup> 0.9	55.21 <sup>s</sup> .17	37.6 <sup>"</sup> 0.0	52.34 <sup>s</sup> .17	45.5 <sup>"</sup> +0.2
Oct. 7.3	31.45 <sup>s</sup> .60	79.3 <sup>"</sup> +0.3	63.44 <sup>s</sup> .81	68.5 <sup>"</sup> +0.4	55.03 <sup>s</sup> .18	37.5 <sup>"</sup> -0.2	52.17 <sup>s</sup> .17	45.8 <sup>"</sup> 0.3
17.2	30.84 <sup>s</sup> .60	79.3 <sup>"</sup> -0.3	62.62 <sup>s</sup> .81	68.6 <sup>"</sup> -0.2	54.86 <sup>s</sup> .17	37.2 <sup>"</sup> 0.4	52.00 <sup>s</sup> .17	46.1 <sup>"</sup> 0.4
27.2	30.25 <sup>s</sup> .57	78.7 <sup>"</sup> 0.8	61.82 <sup>s</sup> .79	68.2 <sup>"</sup> 0.7	54.69 <sup>s</sup> .16	36.7 <sup>"</sup> 0.6	51.83 <sup>s</sup> .16	46.5 <sup>"</sup> 0.4
Nov. 6.2	29.69 <sup>s</sup> .54	77.6 <sup>"</sup> 1.4	61.05 <sup>s</sup> .74	67.2 <sup>"</sup> 1.3	54.54 <sup>s</sup> .13	36.0 <sup>"</sup> 0.8	51.69 <sup>s</sup> .13	47.0 <sup>"</sup> 0.5
16.2	29.18 <sup>s</sup> .48	76.0 <sup>"</sup> 1.9	60.33 <sup>s</sup> .68	65.7 <sup>"</sup> 1.8	54.42 <sup>s</sup> .10	35.1 <sup>"</sup> 0.9	51.56 <sup>s</sup> .10	47.5 <sup>"</sup> 0.6
26.1	28.73 <sup>s</sup> .41	73.8 <sup>"</sup> 2.4	59.69 <sup>s</sup> .59	63.6 <sup>"</sup> 2.3	54.34 <sup>s</sup> .07	34.1 <sup>"</sup> 1.1	51.48 <sup>s</sup> .07	48.2 <sup>"</sup> 0.7
Dec. 6.1	28.36 <sup>s</sup> .33	71.1 <sup>"</sup> 2.8	59.15 <sup>s</sup> .48	61.1 <sup>"</sup> 2.7	54.29 <sup>s</sup> -.03	32.9 <sup>"</sup> 1.3	51.43 <sup>s</sup> -.03	48.9 <sup>"</sup> 0.8
16.1	28.08 <sup>s</sup> .23	68.1 <sup>"</sup> 3.2	58.73 <sup>s</sup> .36	58.2 <sup>"</sup> 3.1	54.28 <sup>s</sup> +0.01	31.6 <sup>"</sup> 1.4	51.41 <sup>s</sup> +0.01	49.7 <sup>"</sup> 0.8
26.0	27.90 <sup>s</sup> .13	64.8 <sup>"</sup> 3.4	58.42 <sup>s</sup> .23	54.9 <sup>"</sup> 3.4	54.31 <sup>s</sup> .05	30.2 <sup>"</sup> 1.5	51.44 <sup>s</sup> .05	50.6 <sup>"</sup> 0.8
36.0	27.82 <sup>s</sup> -.03	61.3 <sup>"</sup> -3.6	58.26 <sup>s</sup> -.09	51.5 <sup>"</sup> -3.6	54.39 <sup>s</sup> +0.09	28.7 <sup>"</sup> -1.5	51.51 <sup>s</sup> +0.09	51.4 <sup>"</sup> +0.9

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\gamma$ Aquilæ.		$\alpha$ Aquilæ. ( <i>Allair.</i> )		$\epsilon$ Draconis.		$\beta$ Aquilæ.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 19 <sup>m</sup> 39	<sup>°</sup> 10 <sup>'</sup> 17	<sup>h</sup> 19 <sup>m</sup> 44	<sup>°</sup> 8 <sup>'</sup> 31	<sup>h</sup> 19 <sup>m</sup> 48	<sup>°</sup> 69 <sup>'</sup> 55	<sup>h</sup> 19 <sup>m</sup> 48	<sup>°</sup> 6 <sup>'</sup> 4
Jan. 1.0	59.96 +.05	50.3 -1.8	21.54 +.05	32.2 -1.7	32.99 -.18	71.7 -3.3	50.74 +.04	57.3 -1.6
11.0	60.03 .08	48.4 1.8	21.60 .08	30.5 1.7	32.87 -.06	68.2 3.5	50.80 .08	55.7 1.6
21.0	60.13 .12	46.6 1.8	21.71 .12	28.8 1.6	32.86 +.05	64.7 3.5	50.90 .11	54.1 1.5
31.0	60.27 .15	44.9 1.6	21.84 .15	27.2 1.5	32.98 .17	61.2 3.4	51.03 .15	52.7 1.4
Feb. 9.9	60.43 .18	43.4 1.4	22.00 .18	25.8 1.3	33.21 .28	57.9 3.2	51.19 .17	51.3 1.2
19.9	60.63 .21	42.1 1.2	22.19 .20	24.5 1.1	33.54 .39	54.8 2.9	51.38 .20	50.2 1.0
Mar. 1.9	60.84 .23	41.1 0.9	22.41 .23	23.6 0.8	33.98 .48	52.1 2.4	51.59 .22	49.4 0.7
11.9	61.08 .25	40.4 0.5	22.65 .25	23.0 0.4	34.50 .55	50.0 1.9	51.82 .24	48.9 -0.4
21.8	61.34 .27	40.1 -0.1	22.91 .27	22.8 -0.1	35.08 .61	48.4 1.3	52.08 .26	48.7 0.0
31.8	61.62 .28	40.2 +0.3	23.18 .28	22.8 +0.3	35.72 .65	47.4 -0.7	52.35 .27	48.8 +0.3
Apr. 10.8	61.90 .29	40.6 0.7	23.46 .29	23.4 0.7	36.38 .68	47.1 0.0	52.63 .28	49.3 0.7
20.7	62.19 .29	41.5 1.0	23.75 .29	24.2 1.0	37.04 .66	47.4 +0.6	52.92 .29	50.2 1.0
30.7	62.48 .29	42.7 1.3	24.04 .29	25.4 1.3	37.70 .64	48.3 1.3	53.21 .29	51.3 1.3
May 10.7	62.76 .28	44.1 1.6	24.33 .28	26.9 1.6	38.32 .60	49.9 1.8	53.49 .28	52.7 1.5
20.7	63.03 .26	45.9 1.8	24.60 .27	28.6 1.8	38.89 .53	51.9 2.3	53.77 .27	54.3 1.7
30.6	63.29 .25	47.8 1.9	24.86 .25	30.4 1.9	39.39 .46	54.5 2.7	54.03 .25	56.1 1.8
June 9.6	63.52 .22	49.8 2.0	25.10 .22	32.4 2.0	39.81 .37	57.3 3.0	54.27 .23	57.9 1.9
19.6	63.73 .19	51.8 2.0	25.31 .19	34.4 2.0	40.13 .28	60.5 3.3	54.49 .20	59.8 1.9
29.6	63.90 .15	53.8 2.0	25.48 .16	36.3 2.0	40.36 .17	63.9 3.4	54.67 .16	61.6 1.8
July 9.5	64.03 .11	55.8 1.9	25.62 .12	38.3 1.9	40.47 +.06	67.4 3.5	54.81 .12	63.4 1.7
19.5	64.12 .07	57.7 1.8	25.72 .07	40.1 1.7	40.48 -.05	70.9 3.5	54.91 .08	65.1 1.6
29.5	64.16 +.02	59.4 1.6	25.77 +.03	41.7 1.6	40.38 .16	74.3 3.4	54.96 +.03	66.6 1.4
Aug. 8.4	64.16 -.02	61.0 1.4	25.77 -.01	43.2 1.4	40.17 .26	77.6 3.2	54.97 -.01	67.9 1.2
18.4	64.12 .06	62.3 1.2	25.74 .06	44.5 1.2	39.85 .36	80.6 2.9	54.94 .05	69.1 1.0
28.4	64.04 .10	63.4 1.0	25.66 .09	45.5 0.9	39.45 .45	83.4 2.6	54.87 .09	70.0 0.8
Sept. 7.4	63.92 .13	64.2 0.7	25.55 .13	46.3 0.7	38.96 .52	85.9 2.2	54.76 .12	70.7 0.6
17.3	63.77 .16	64.8 0.5	25.41 .15	46.9 0.4	38.40 .58	87.9 1.8	54.63 .15	71.2 0.4
27.3	63.61 .17	65.2 +0.2	25.25 .17	47.2 +0.2	37.79 .63	89.5 1.3	54.47 .17	71.4 +0.1
Oct. 7.3	63.43 .18	65.3 -0.1	25.07 .18	47.3 0.0	37.14 .66	90.6 0.8	54.30 .17	71.4 -0.1
17.3	63.25 .16	65.1 0.3	24.90 .17	47.1 -0.3	36.47 .67	91.1 +0.3	54.12 .17	71.2 0.3
27.2	63.07 .17	64.6 0.6	24.72 .16	46.7 0.5	35.80 .66	91.1 -0.3	53.95 .16	70.8 0.5
Nov. 6.2	62.91 .15	63.9 0.8	24.57 .15	46.0 0.8	35.15 .64	90.6 0.8	53.80 .15	70.2 0.8
16.2	62.78 .12	63.0 1.1	24.43 .12	45.1 1.0	34.53 .59	89.5 1.4	53.66 .12	69.3 1.0
26.1	62.68 .09	61.8 1.3	24.33 .09	44.0 1.2	33.97 .53	87.8 1.9	53.56 .09	68.2 1.2
Dec. 6.1	62.60 .05	60.4 1.5	24.26 .05	42.7 1.4	33.48 .45	85.7 2.4	53.49 .05	67.0 1.3
16.1	62.57 -.02	58.8 1.7	24.22 -.02	41.2 1.6	33.07 .36	83.0 2.8	53.45 -.02	65.6 1.5
26.1	62.57 +.02	57.0 1.8	24.23 +.02	39.6 1.7	32.76 .25	80.0 3.2	53.45 +.02	64.1 1.5
36.0	62.62 +.07	55.2 -1.8	24.27 +.06	37.9 -1.7	32.57 -.13	76.7 -3.4	53.49 +.06	62.5 -1.6

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\tau$ Aquilæ.		$\alpha^2$ Capricorni.		$\star\kappa$ Cephei.		$\alpha$ Pavonis.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 19 <sup>m</sup> 57	<sup>°</sup> 6 <sup>'</sup> 54	<sup>h</sup> 20 <sup>m</sup> 10	<sup>°</sup> 12 <sup>'</sup> 56	<sup>h</sup> 20 <sup>m</sup> 13	<sup>°</sup> 77 <sup>'</sup> 18	<sup>h</sup> 20 <sup>m</sup> 15	<sup>°</sup> 57 <sup>'</sup> 8
Jan. 1.0	42.58 +.03	40.1 -1.6	44.96 +.04	54.5 +0.4	10.91 -45	66.3 -3.1	12.62 +.02	68.6 -2.1
11.0	42.63 .07	38.5 1.6	45.01 .07	54.9 0.4	10.55 .27	63.1 3.3	12.68 .09	66.4 2.2
21.0	42.72 .10	37.0 1.5	45.10 .10	55.3 0.3	10.38 -.08	59.7 3.4	12.80 .16	64.1 2.3
31.0	42.84 .14	35.5 1.4	45.22 .14	55.5 0.2	10.39 +.11	56.2 3.4	12.99 .22	61.8 2.4
Feb. 9.9	42.99 .17	34.1 1.2	45.38 .17	55.7 +0.1	10.59 .29	52.8 3.3	13.24 .28	59.4 2.3
19.9	43.17 .19	33.0 1.0	45.56 .20	55.7 -0.1	10.98 .47	49.6 3.0	13.54 .33	57.2 2.2
Mar. 1.9	43.37 .22	32.2 0.7	45.77 .22	55.6 0.2	11.53 .63	46.7 2.7	13.89 .37	55.0 2.1
11.9	43.60 .24	31.6 -0.4	46.00 .24	55.3 0.4	12.23 .76	44.3 2.2	14.29 .42	53.0 1.9
21.8	43.85 .26	31.4 0.0	46.25 .26	54.8 0.6	13.06 .87	42.3 1.6	14.72 .45	51.1 1.7
31.8	44.12 .27	31.5 +0.3	46.52 .28	54.1 0.8	13.97 .95	41.0 1.0	15.19 .48	49.5 1.5
Apr. 10.8	44.39 .28	32.0 0.7	46.81 .29	53.2 0.9	14.95 .99	40.3 -0.4	15.67 .50	48.1 1.2
20.7	44.68 .29	32.9 1.0	47.11 .30	52.2 1.1	15.95 1.00	40.2 +0.2	16.18 .51	47.1 0.9
30.7	44.97 .29	34.0 1.3	47.41 .30	51.1 1.2	16.94 .98	40.7 0.9	16.69 .51	46.3 0.6
May 10.7	45.26 .28	35.5 1.5	47.71 .30	49.9 1.2	17.90 .92	41.9 1.4	17.20 .51	45.8 -0.3
20.7	45.54 .27	37.1 1.7	48.01 .29	48.7 1.2	18.79 .84	43.6 2.0	17.71 .49	45.7 +0.1
30.6	45.81 .26	38.9 1.8	48.30 .28	47.5 1.2	19.58 .73	45.8 2.4	18.19 .47	46.0 0.4
June 9.6	46.05 .23	40.8 1.9	48.57 .26	46.3 1.1	20.25 .61	48.4 2.8	18.64 .43	46.6 0.8
19.6	46.27 .20	42.7 1.9	48.81 .23	45.2 1.0	20.79 .46	51.4 3.1	19.05 .38	47.5 1.1
29.6	46.46 .17	44.7 1.9	49.03 .19	44.2 0.9	21.18 .30	54.7 3.3	19.40 .32	48.7 1.4
July 9.5	46.61 .13	46.5 1.8	49.20 .16	43.4 0.8	21.40 +.14	58.1 3.5	19.69 .26	50.3 1.7
19.5	46.72 .08	48.3 1.7	49.34 .11	42.7 0.6	21.45 -.03	61.6 3.5	19.91 .18	52.0 1.9
29.5	46.78 +.04	49.9 1.5	49.43 .07	42.2 0.4	21.34 .19	65.0 3.5	20.06 .11	54.0 2.0
Aug. 8.4	46.80 .00	51.3 1.3	49.47 +.02	41.8 0.3	21.07 .36	68.5 3.3	20.12 +.03	56.0 2.1
18.4	46.78 -.04	52.5 1.1	49.47 -.02	41.6 -0.1	20.63 .51	71.7 3.2	20.11 -.05	58.1 2.1
28.4	46.71 .08	53.5 0.9	49.42 .07	41.6 0.0	20.05 .65	74.8 2.9	20.02 .13	60.2 2.0
Sept. 7.4	46.61 .12	54.3 0.7	49.34 .10	41.7 +0.2	19.33 .77	77.5 2.6	19.86 .19	62.1 1.9
17.3	46.48 .14	54.8 0.4	49.22 .13	41.9 0.3	18.50 .88	79.9 2.2	19.64 .25	63.9 1.6
27.3	46.32 .16	55.1 +0.2	49.08 .15	42.2 0.3	17.57 .96	81.9 1.8	19.37 .29	65.4 1.3
Oct. 7.3	46.15 .17	55.2 0.0	48.92 .16	42.6 0.4	16.57 1.03	83.4 1.3	19.06 .32	66.6 1.0
17.3	45.98 .17	55.1 -0.3	48.75 .17	43.0 0.4	15.52 1.06	84.5 0.8	18.74 .33	67.4 0.6
27.2	45.81 .16	54.7 0.5	48.58 .16	43.4 0.5	14.45 1.07	85.0 +0.2	18.41 .32	67.7 +0.2
Nov. 6.2	45.65 .15	54.1 0.7	48.43 .15	43.9 0.5	13.38 1.05	84.9 -0.4	18.10 .30	67.7 -0.2
16.2	45.51 .12	53.2 0.9	48.29 .12	44.4 0.5	12.34 1.01	84.3 0.9	17.81 .26	67.2 0.7
26.1	45.40 .09	52.2 1.1	48.18 .09	44.8 0.5	11.36 .94	83.1 1.5	17.57 .21	66.3 1.1
Dec. 6.1	45.33 .06	51.0 1.3	48.11 .06	45.3 0.5	10.47 .83	81.3 2.0	17.39 .15	65.1 1.4
16.1	45.28 -.03	49.6 1.4	48.07 -.02	45.8 0.5	9.70 .70	79.0 2.5	17.27 .09	63.5 1.7
26.1	45.28 +.01	48.1 1.5	48.06 +.01	46.3 0.5	9.07 .55	76.3 2.9	17.21 -.02	61.6 2.0
36.0	45.31 +.05	46.5 -1.6	48.09 +.05	46.7 +0.4	8.60 -.38	73.3 -3.2	17.23 +.05	59.5 -2.2

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\pi$ Capricorni.		$\epsilon$ Delphini.		*Groombridge 3241.		$\alpha$ Cygni.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 20 19	<sup>°</sup> <sup>'</sup> 18 38	<sup>h</sup> <sup>m</sup> 20 26	<sup>°</sup> <sup>'</sup> 10 51	<sup>h</sup> <sup>m</sup> 20 30	<sup>°</sup> <sup>'</sup> 72 5	<sup>h</sup> <sup>m</sup> 20 36	<sup>°</sup> <sup>'</sup> 44 48
Jan. 1.1	47.07 +.03	20.2 +0.1	55.42 .00	38.3 -1.7	29.95 -.33	27.6 -3.0	56.16 -.08	57.1 -2.8
11.0	47.12 .07	20.2 0.0	55.44 +.04	36.6 1.7	29.68 .91	24.4 3.3	56.11 -.03	54.2 3.0
21.0	47.20 .10	20.2 -0.1	55.50 .07	35.9 1.7	29.54 -.08	21.0 3.4	56.10 +.02	51.2 3.1
31.0	47.32 .13	20.1 0.2	55.58 .10	33.3 1.6	29.52 +.05	17.6 3.5	56.15 .07	48.1 3.0
Feb. 10.0	47.46 .16	19.9 0.4	55.70 .14	31.8 1.4	29.64 .18	14.1 3.3	56.25 .12	45.1 2.9
19.9	47.64 .19	19.5 0.5	55.85 .17	30.5 1.2	29.88 .31	10.9 3.1	56.39 .17	42.3 2.6
Mar. 1.9	47.85 .22	19.1 0.7	56.03 .19	29.4 0.9	30.25 .42	7.9 2.8	56.59 .22	39.9 2.3
11.9	48.08 .24	18.5 0.8	56.24 .22	28.7 0.6	30.73 .52	5.4 2.3	56.83 .26	37.8 1.8
21.9	48.34 .27	17.7 0.9	56.47 .24	28.3 -0.2	31.29 .61	3.3 1.8	57.10 .29	36.2 1.3
31.8	48.61 .28	16.8 0.9	56.73 .26	28.4 +0.2	31.94 .67	1.8 1.2	57.41 .32	35.2 0.7
Apr. 10.8	48.90 .30	15.8 1.0	57.00 .28	28.8 0.6	32.64 .71	0.9 -0.6	57.75 .35	34.8 -0.2
20.8	49.21 .31	14.8 1.1	57.28 .29	29.5 0.9	33.36 .73	0.7 +0.1	58.10 .36	34.9 +0.4
30.7	49.52 .31	13.6 1.2	57.58 .29	30.7 1.3	34.10 .73	1.1 0.7	58.47 .37	35.7 1.0
May 10.7	49.83 .31	12.5 1.2	57.87 .29	32.1 1.6	34.82 .70	2.1 1.3	58.84 .38	36.9 1.5
20.7	50.14 .31	11.3 1.1	58.16 .29	33.8 1.8	35.50 .66	3.7 1.9	59.19 .35	38.7 2.0
30.7	50.44 .29	10.2 1.1	58.44 .27	35.7 2.0	36.13 .59	5.8 2.3	59.53 .32	40.9 2.4
June 9.6	50.73 .27	9.2 0.9	58.71 .25	37.7 2.1	36.68 .50	8.4 2.7	59.84 .29	43.5 2.7
19.6	50.99 .24	8.3 0.8	58.94 .22	39.9 2.1	37.13 .41	11.3 3.1	60.12 .25	46.4 3.0
29.6	51.21 .21	7.6 0.6	59.15 .19	42.0 2.1	37.49 .30	14.5 3.3	60.35 .21	49.5 3.2
July 9.6	51.40 .17	7.1 0.5	59.32 .15	44.1 2.1	37.73 .18	18.0 3.5	60.53 .16	52.7 3.3
19.5	51.55 .13	6.7 0.3	59.46 .11	46.1 2.0	37.85 +.06	21.5 3.5	60.66 .10	56.0 3.3
29.5	51.66 .08	6.5 -0.1	59.54 .07	48.0 1.8	37.86 -.06	25.0 3.5	60.73 +.04	59.2 3.2
Aug. 8.5	51.71 +.03	6.4 +0.1	59.59 +.02	49.7 1.6	37.74 .18	28.5 3.4	60.75 -.01	62.4 3.1
18.4	51.72 -.02	6.6 0.2	59.59 -.02	51.2 1.4	37.50 .29	31.9 3.3	60.71 .07	65.4 2.8
28.4	51.68 .06	6.8 0.3	59.55 .06	52.5 1.2	37.16 .40	35.1 3.0	60.61 .12	68.1 2.6
Sept. 7.4	51.60 .10	7.2 0.4	59.46 .10	53.6 0.9	36.71 .49	38.0 2.7	60.47 .17	70.5 2.3
17.4	51.49 .13	7.7 0.5	59.35 .13	54.4 0.7	36.18 .57	40.5 2.4	60.28 .21	72.6 1.9
27.3	51.35 .15	8.2 0.5	59.21 .15	54.9 0.4	35.57 .64	42.7 2.0	60.06 .23	74.3 1.5
Oct. 7.3	51.19 .17	8.7 0.5	59.05 .17	55.2 +0.2	34.90 .69	44.5 1.5	59.81 .26	75.6 1.1
17.3	51.02 .17	9.2 0.5	58.87 .17	55.2 -0.1	34.18 .72	45.7 1.0	59.55 .27	76.4 0.6
27.3	50.85 .17	9.7 0.5	58.70 .17	54.9 0.4	33.45 .74	46.4 +0.4	59.28 .27	76.8 +0.1
Nov. 6.2	50.68 .15	10.1 0.4	58.54 .16	54.4 0.6	32.71 .73	46.5 -0.2	59.01 .26	76.6 -0.4
16.2	50.54 .13	10.5 0.4	58.39 .14	53.7 0.9	31.99 .70	46.1 0.7	58.75 .25	76.0 0.9
26.2	50.43 .10	10.8 0.3	58.27 .11	52.7 1.1	31.31 .65	45.1 1.3	58.51 .22	74.8 1.4
Dec. 6.1	50.34 .07	11.1 0.2	58.17 .08	51.5 1.3	30.68 .59	43.5 1.8	58.31 .19	73.2 1.9
16.1	50.30 -.03	11.3 0.2	58.10 .05	50.0 1.5	30.13 .50	41.4 2.3	58.14 .15	71.1 2.3
26.1	50.28 +.01	11.5 +0.1	58.06 -.02	48.5 1.6	29.68 .40	38.8 2.8	58.01 .11	68.6 2.6
36.1	50.31 +.05	11.6 0.0	58.06 +.01	46.8 -1.7	29.33 -.26	35.8 -3.1	57.93 -.06	65.9 -2.9

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\mu$ Aquarii.		$\gamma$ Cygni.		*12 Year Cat. 1879.		61 <sup>1</sup> Cygni.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 20 <sup>m</sup> 45	<sup>°</sup> 9 <sup>'</sup> 28	<sup>h</sup> 20 <sup>m</sup> 52	<sup>°</sup> 40 <sup>'</sup> 39	<sup>h</sup> 20 <sup>m</sup> 53	<sup>°</sup> 80 <sup>'</sup> 3	<sup>h</sup> 21 <sup>m</sup> 0	<sup>°</sup> 38 <sup>'</sup> 6
Jan. 1.1	33.19 .00	23.2 +0.6	15.67 -0.06	58.9 -2.6	22.39 -0.78	46.3 -2.7	59.62 -0.07	31.4 -2.3
11.1	33.21 +0.04	23.8 0.5	15.62 -0.04	56.2 2.8	21.71 .57	43.4 3.0	59.57 -0.03	28.9 2.6
21.0	33.26 .07	24.3 0.4	15.60 +0.01	53.4 2.9	21.25 .35	40.2 3.3	59.56 +0.01	26.2 2.7
31.0	33.35 .10	24.7 0.3	15.64 .06	50.5 2.9	21.02 -0.11	36.9 3.4	59.60 .06	23.5 2.7
Feb. 10.0	33.46 .13	24.9 +0.2	15.72 .10	47.7 2.7	21.03 +0.13	33.4 3.4	59.68 .10	20.9 2.6
20.0	33.61 .16	25.0 0.0	15.84 .15	45.0 2.5	21.29 .38	30.1 3.2	59.80 .15	18.4 2.3
Mar. 1.9	33.78 .19	25.0 -0.2	16.01 .19	42.6 2.2	21.77 .59	27.0 3.0	59.97 .19	16.2 2.0
11.9	33.98 .21	24.7 0.4	16.22 .23	40.7 1.8	22.47 .79	24.2 2.6	60.17 .23	14.4 1.6
21.9	34.21 .24	24.2 0.6	16.47 .27	39.1 1.3	23.36 .96	21.9 2.1	60.42 .26	13.0 1.2
31.8	34.46 .26	23.5 0.8	16.76 .30	38.1 0.7	24.39 1.09	20.0 1.5	60.70 .29	12.0 0.6
Apr. 10.8	34.72 .28	22.6 1.0	17.07 .32	37.6 -0.2	25.54 1.19	18.8 1.0	61.01 .32	11.7 -0.1
20.8	35.01 .29	21.5 1.2	17.41 .34	37.7 +0.4	26.76 1.24	18.1 -0.3	61.34 .34	11.8 +0.5
30.8	35.31 .30	20.2 1.3	17.75 .35	38.4 0.9	28.02 1.25	18.1 +0.3	61.68 .35	12.6 1.0
May 10.7	35.61 .30	18.8 1.4	18.10 .35	39.6 1.4	29.26 1.21	18.7 0.9	62.03 .35	13.8 1.5
20.7	35.91 .30	17.4 1.5	18.44 .34	41.3 1.9	30.45 1.14	19.9 1.5	62.38 .34	15.5 1.9
30.7	36.21 .29	15.9 1.5	18.78 .32	43.4 2.3	31.55 1.04	21.7 2.0	62.72 .33	17.7 2.3
June 9.7	36.49 .27	14.5 1.4	19.09 .30	45.8 2.6	32.52 .90	23.9 2.4	63.04 .31	20.2 2.6
19.6	36.76 .25	13.1 1.3	19.37 .28	48.6 2.9	33.35 .74	26.6 2.8	63.33 .27	23.0 2.9
29.6	36.99 .22	11.8 1.2	19.61 .25	51.6 3.0	34.00 .56	29.6 3.1	63.59 .24	26.0 3.1
July 9.6	37.19 .18	10.6 1.1	19.81 .17	54.7 3.2	34.47 .37	32.8 3.4	63.80 .19	29.1 3.2
19.5	37.36 .14	9.6 0.9	19.96 .12	57.9 3.2	34.74 +0.16	36.3 3.5	63.97 .14	32.3 3.2
29.5	37.48 .10	8.8 0.7	20.05 .07	61.0 3.1	34.80 -0.05	39.8 3.5	64.09 .09	35.4 3.1
Aug. 8.5	37.55 .05	8.2 0.5	20.09 +0.02	64.1 3.0	34.64 .25	43.3 3.5	64.15 +0.04	38.5 3.0
18.5	37.58 +0.01	7.8 0.3	20.08 -0.04	67.0 2.8	34.29 .45	46.8 3.4	64.17 -0.01	41.5 2.8
28.4	37.56 -0.04	7.5 -0.2	20.02 .09	69.7 2.6	33.74 .64	50.2 3.3	64.13 .06	44.2 2.6
Sept. 7.4	37.51 .07	7.5 0.0	19.91 .13	72.1 2.3	33.01 .81	53.3 3.0	64.04 .11	46.7 2.3
17.4	37.42 .11	7.5 +0.1	19.75 .17	74.2 1.9	32.12 .97	56.2 2.7	63.92 .14	48.8 2.0
27.4	37.29 .13	7.8 0.3	19.57 .20	75.9 1.5	31.08 1.10	58.8 2.3	63.76 .18	50.6 1.6
Oct. 7.3	37.15 .15	8.1 0.4	19.35 .22	77.2 1.1	29.92 1.20	60.9 1.9	63.57 .20	52.0 1.2
17.3	37.00 .16	8.5 0.4	19.12 .24	78.2 0.7	28.67 1.29	62.6 1.4	63.36 .21	53.0 0.8
27.3	36.83 .16	9.0 0.5	18.87 .25	78.6 +0.2	27.34 1.34	63.7 0.9	63.14 .22	53.6 +0.3
Nov. 6.2	36.68 .15	9.5 0.5	18.63 .24	78.5 -0.3	25.99 1.35	64.3 +0.3	62.92 .22	53.7 -0.1
16.2	36.54 .13	10.0 0.6	18.40 .22	78.0 0.8	24.64 1.33	64.4 -0.2	62.71 .20	53.3 0.6
26.2	36.42 .11	10.6 0.6	18.18 .20	77.0 1.2	23.32 1.28	63.8 0.8	62.51 .18	52.5 1.1
Dec. 6.2	36.32 .08	11.2 0.6	17.99 .18	75.6 1.7	22.08 1.19	62.7 1.4	62.34 .16	51.2 1.5
16.1	36.26 .05	11.8 0.6	17.83 .14	73.7 2.1	20.95 1.06	61.0 1.9	62.20 .13	49.5 1.9
26.1	36.22 -0.02	12.4 0.6	17.71 .10	71.4 2.4	19.96 .89	58.8 2.4	62.08 .09	47.5 2.2
36.1	36.22 +0.01	13.0 +0.6	17.62 -0.06	68.9 -2.7	19.15 -0.68	56.2 -2.8	62.01 -0.05	45.1 -2.4



## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\zeta$ Cygni.		$\alpha$ Cephei.		$\gamma$ Pegasi.		$\beta$ Aquarii.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.
	<sup>h</sup> 21 <sup>m</sup> 7	<sup>°</sup> 29 <sup>'</sup> 41	<sup>h</sup> 21 <sup>m</sup> 15	<sup>°</sup> 62 <sup>'</sup> 1	<sup>h</sup> 21 <sup>m</sup> 16	<sup>°</sup> 19 <sup>'</sup> 14	<sup>h</sup> 21 <sup>m</sup> 24	<sup>°</sup> 6 <sup>'</sup> 8
Jan. 1.1	20.07 <sup>h</sup> -06 <sup>m</sup>	33.2 <sup>°</sup> -2.2 <sup>'</sup>	25.20 <sup>h</sup> -25 <sup>m</sup>	62.9 <sup>°</sup> -2.6 <sup>'</sup>	0.18 <sup>h</sup> -05 <sup>m</sup>	48.8 <sup>°</sup> -1.8 <sup>'</sup>	37.90 <sup>h</sup> -03 <sup>m</sup>	47.4 <sup>°</sup> +0.7 <sup>'</sup>
11.1	20.03 <sup>h</sup> -03 <sup>m</sup>	30.9 <sup>°</sup> 2.3 <sup>'</sup>	24.99 <sup>h</sup> .18 <sup>m</sup>	60.1 <sup>°</sup> 2.9 <sup>'</sup>	0.15 <sup>h</sup> -02 <sup>m</sup>	47.0 <sup>°</sup> 1.9 <sup>'</sup>	37.89 <sup>h</sup> .00 <sup>m</sup>	48.0 <sup>°</sup> 0.6 <sup>'</sup>
21.1	20.02 <sup>h</sup> +01 <sup>m</sup>	28.5 <sup>°</sup> 2.4 <sup>'</sup>	24.85 <sup>h</sup> .10 <sup>m</sup>	57.0 <sup>°</sup> 3.2 <sup>'</sup>	0.15 <sup>h</sup> +02 <sup>m</sup>	45.1 <sup>°</sup> 1.9 <sup>'</sup>	37.90 <sup>h</sup> +03 <sup>m</sup>	48.6 <sup>°</sup> 0.5 <sup>'</sup>
31.0	20.05 <sup>h</sup> .05 <sup>m</sup>	26.1 <sup>°</sup> 2.4 <sup>'</sup>	24.78 <sup>h</sup> -02 <sup>m</sup>	53.8 <sup>°</sup> 3.3 <sup>'</sup>	0.18 <sup>h</sup> .05 <sup>m</sup>	43.1 <sup>°</sup> 1.9 <sup>'</sup>	37.94 <sup>h</sup> .06 <sup>m</sup>	49.1 <sup>°</sup> 0.4 <sup>'</sup>
Feb. 10.0	20.12 <sup>h</sup> .09 <sup>m</sup>	23.7 <sup>°</sup> 2.3 <sup>'</sup>	24.85 <sup>h</sup> +06 <sup>m</sup>	50.5 <sup>°</sup> 3.3 <sup>'</sup>	0.25 <sup>h</sup> .08 <sup>m</sup>	41.3 <sup>°</sup> 1.8 <sup>'</sup>	38.01 <sup>h</sup> .09 <sup>m</sup>	49.5 <sup>°</sup> 0.3 <sup>'</sup>
20.0	20.22 <sup>h</sup> .13 <sup>m</sup>	21.5 <sup>°</sup> 2.1 <sup>'</sup>	24.90 <sup>h</sup> .14 <sup>m</sup>	47.2 <sup>°</sup> 3.1 <sup>'</sup>	0.35 <sup>h</sup> .12 <sup>m</sup>	39.6 <sup>°</sup> 1.6 <sup>'</sup>	38.12 <sup>h</sup> .12 <sup>m</sup>	49.7 <sup>°</sup> +0.1 <sup>'</sup>
Mar. 1.9	20.37 <sup>h</sup> .16 <sup>m</sup>	19.5 <sup>°</sup> 1.8 <sup>'</sup>	25.08 <sup>h</sup> .22 <sup>m</sup>	44.2 <sup>°</sup> 2.9 <sup>'</sup>	0.48 <sup>h</sup> .15 <sup>m</sup>	38.1 <sup>°</sup> 1.3 <sup>'</sup>	38.25 <sup>h</sup> .15 <sup>m</sup>	49.7 <sup>°</sup> -0.1 <sup>'</sup>
11.9	20.55 <sup>h</sup> .20 <sup>m</sup>	17.9 <sup>°</sup> 1.4 <sup>'</sup>	25.34 <sup>h</sup> .29 <sup>m</sup>	41.5 <sup>°</sup> 2.5 <sup>'</sup>	0.65 <sup>h</sup> .18 <sup>m</sup>	37.0 <sup>°</sup> 1.0 <sup>'</sup>	38.41 <sup>h</sup> .18 <sup>m</sup>	49.5 <sup>°</sup> 0.3 <sup>'</sup>
21.9	20.76 <sup>h</sup> .23 <sup>m</sup>	16.7 <sup>°</sup> 1.0 <sup>'</sup>	25.66 <sup>h</sup> .35 <sup>m</sup>	39.2 <sup>°</sup> 2.0 <sup>'</sup>	0.85 <sup>h</sup> .21 <sup>m</sup>	36.2 <sup>°</sup> 0.6 <sup>'</sup>	38.61 <sup>h</sup> .21 <sup>m</sup>	49.1 <sup>°</sup> 0.6 <sup>'</sup>
31.9	21.01 <sup>h</sup> .26 <sup>m</sup>	15.9 <sup>°</sup> -0.5 <sup>'</sup>	26.05 <sup>h</sup> .41 <sup>m</sup>	37.4 <sup>°</sup> 1.5 <sup>'</sup>	1.08 <sup>h</sup> .24 <sup>m</sup>	35.8 <sup>°</sup> -0.2 <sup>'</sup>	38.83 <sup>h</sup> .23 <sup>m</sup>	48.4 <sup>°</sup> 0.8 <sup>'</sup>
Apr. 10.8	21.28 <sup>h</sup> .29 <sup>m</sup>	15.7 <sup>°</sup> 0.0 <sup>'</sup>	26.50 <sup>h</sup> .46 <sup>m</sup>	36.2 <sup>°</sup> 0.9 <sup>'</sup>	1.33 <sup>h</sup> .27 <sup>m</sup>	35.9 <sup>°</sup> +0.3 <sup>'</sup>	39.07 <sup>h</sup> .26 <sup>m</sup>	47.5 <sup>°</sup> 1.0 <sup>'</sup>
20.8	21.58 <sup>h</sup> .30 <sup>m</sup>	15.9 <sup>°</sup> +0.5 <sup>'</sup>	26.98 <sup>h</sup> .49 <sup>m</sup>	35.6 <sup>°</sup> -0.3 <sup>'</sup>	1.51 <sup>h</sup> .29 <sup>m</sup>	36.3 <sup>°</sup> 0.7 <sup>'</sup>	39.34 <sup>h</sup> .28 <sup>m</sup>	46.4 <sup>°</sup> 1.2 <sup>'</sup>
30.8	21.89 <sup>h</sup> .32 <sup>m</sup>	16.6 <sup>°</sup> 1.0 <sup>'</sup>	27.48 <sup>h</sup> .51 <sup>m</sup>	35.7 <sup>°</sup> +0.3 <sup>'</sup>	1.90 <sup>h</sup> .30 <sup>m</sup>	37.2 <sup>°</sup> 1.1 <sup>'</sup>	39.62 <sup>h</sup> .29 <sup>m</sup>	45.0 <sup>°</sup> 1.4 <sup>'</sup>
May 10.8	22.21 <sup>h</sup> .32 <sup>m</sup>	17.8 <sup>°</sup> 1.4 <sup>'</sup>	27.99 <sup>h</sup> .51 <sup>m</sup>	36.3 <sup>°</sup> 0.9 <sup>'</sup>	2.20 <sup>h</sup> .31 <sup>m</sup>	38.5 <sup>°</sup> 1.5 <sup>'</sup>	39.92 <sup>h</sup> .30 <sup>m</sup>	43.5 <sup>°</sup> 1.6 <sup>'</sup>
20.7	22.53 <sup>h</sup> .32 <sup>m</sup>	19.5 <sup>°</sup> 1.8 <sup>'</sup>	28.50 <sup>h</sup> .50 <sup>m</sup>	37.6 <sup>°</sup> 1.5 <sup>'</sup>	2.51 <sup>h</sup> .31 <sup>m</sup>	40.2 <sup>°</sup> 1.8 <sup>'</sup>	40.23 <sup>h</sup> .30 <sup>m</sup>	41.9 <sup>°</sup> 1.6 <sup>'</sup>
30.7	22.85 <sup>h</sup> .31 <sup>m</sup>	21.5 <sup>°</sup> 2.2 <sup>'</sup>	28.99 <sup>h</sup> .47 <sup>m</sup>	39.3 <sup>°</sup> 2.0 <sup>'</sup>	2.81 <sup>h</sup> .30 <sup>m</sup>	42.1 <sup>°</sup> 2.0 <sup>'</sup>	40.53 <sup>h</sup> .30 <sup>m</sup>	40.2 <sup>°</sup> 1.7 <sup>'</sup>
June 9.7	23.14 <sup>h</sup> .29 <sup>m</sup>	23.8 <sup>°</sup> 2.4 <sup>'</sup>	29.44 <sup>h</sup> .43 <sup>m</sup>	41.6 <sup>°</sup> 2.5 <sup>'</sup>	3.11 <sup>h</sup> .28 <sup>m</sup>	44.2 <sup>°</sup> 2.3 <sup>'</sup>	40.83 <sup>h</sup> .29 <sup>m</sup>	38.6 <sup>°</sup> 1.7 <sup>'</sup>
19.6	23.42 <sup>h</sup> .26 <sup>m</sup>	26.4 <sup>°</sup> 2.6 <sup>'</sup>	29.85 <sup>h</sup> .38 <sup>m</sup>	44.3 <sup>°</sup> 2.9 <sup>'</sup>	3.38 <sup>h</sup> .26 <sup>m</sup>	46.6 <sup>°</sup> 2.4 <sup>'</sup>	41.11 <sup>h</sup> .27 <sup>m</sup>	36.9 <sup>°</sup> 1.6 <sup>'</sup>
29.6	23.66 <sup>h</sup> .23 <sup>m</sup>	29.1 <sup>°</sup> 2.8 <sup>'</sup>	30.20 <sup>h</sup> .32 <sup>m</sup>	47.3 <sup>°</sup> 3.2 <sup>'</sup>	3.62 <sup>h</sup> .23 <sup>m</sup>	49.0 <sup>°</sup> 2.5 <sup>'</sup>	41.37 <sup>h</sup> .24 <sup>m</sup>	35.3 <sup>°</sup> 1.5 <sup>'</sup>
July 9.6	23.87 <sup>h</sup> .19 <sup>m</sup>	31.9 <sup>°</sup> 2.8 <sup>'</sup>	30.49 <sup>h</sup> .25 <sup>m</sup>	50.6 <sup>°</sup> 3.4 <sup>'</sup>	3.84 <sup>h</sup> .19 <sup>m</sup>	51.5 <sup>°</sup> 2.5 <sup>'</sup>	41.59 <sup>h</sup> .21 <sup>m</sup>	33.9 <sup>°</sup> 1.4 <sup>'</sup>
19.6	24.03 <sup>h</sup> .14 <sup>m</sup>	34.7 <sup>°</sup> 2.8 <sup>'</sup>	30.70 <sup>h</sup> .17 <sup>m</sup>	54.0 <sup>°</sup> 3.5 <sup>'</sup>	4.01 <sup>h</sup> .15 <sup>m</sup>	54.0 <sup>°</sup> 2.4 <sup>'</sup>	41.79 <sup>h</sup> .17 <sup>m</sup>	32.6 <sup>°</sup> 1.2 <sup>'</sup>
29.5	24.15 <sup>h</sup> .09 <sup>m</sup>	37.5 <sup>°</sup> 2.7 <sup>'</sup>	30.83 <sup>h</sup> .09 <sup>m</sup>	57.6 <sup>°</sup> 3.6 <sup>'</sup>	4.14 <sup>h</sup> .11 <sup>m</sup>	56.4 <sup>°</sup> 2.3 <sup>'</sup>	41.94 <sup>h</sup> .13 <sup>m</sup>	31.5 <sup>°</sup> 1.0 <sup>'</sup>
Aug. 8.5	24.22 <sup>h</sup> +05 <sup>m</sup>	40.2 <sup>°</sup> 2.6 <sup>'</sup>	30.88 <sup>h</sup> +01 <sup>m</sup>	61.2 <sup>°</sup> 3.5 <sup>'</sup>	4.23 <sup>h</sup> .06 <sup>m</sup>	58.6 <sup>°</sup> 2.2 <sup>'</sup>	42.05 <sup>h</sup> .09 <sup>m</sup>	30.6 <sup>°</sup> 0.8 <sup>'</sup>
18.5	24.25 <sup>h</sup> .00 <sup>m</sup>	42.8 <sup>°</sup> 2.4 <sup>'</sup>	30.85 <sup>h</sup> -07 <sup>m</sup>	64.7 <sup>°</sup> 3.4 <sup>'</sup>	4.27 <sup>h</sup> +02 <sup>m</sup>	60.7 <sup>°</sup> 2.0 <sup>'</sup>	42.12 <sup>h</sup> +04 <sup>m</sup>	29.9 <sup>°</sup> 0.6 <sup>'</sup>
28.5	24.22 <sup>h</sup> -05 <sup>m</sup>	45.1 <sup>°</sup> 2.2 <sup>'</sup>	30.74 <sup>h</sup> .15 <sup>m</sup>	68.0 <sup>°</sup> 3.2 <sup>'</sup>	4.26 <sup>h</sup> -03 <sup>m</sup>	62.6 <sup>°</sup> 1.8 <sup>'</sup>	42.13 <sup>h</sup> .00 <sup>m</sup>	29.4 <sup>°</sup> 0.4 <sup>'</sup>
Sept. 7.4	24.15 <sup>h</sup> .09 <sup>m</sup>	47.2 <sup>°</sup> 1.9 <sup>'</sup>	30.56 <sup>h</sup> .22 <sup>m</sup>	71.2 <sup>°</sup> 3.0 <sup>'</sup>	4.22 <sup>h</sup> .07 <sup>m</sup>	64.2 <sup>°</sup> 1.5 <sup>'</sup>	42.11 <sup>h</sup> -04 <sup>m</sup>	29.1 <sup>°</sup> -0.2 <sup>'</sup>
17.4	24.04 <sup>h</sup> .13 <sup>m</sup>	48.9 <sup>°</sup> 1.6 <sup>'</sup>	30.31 <sup>h</sup> .28 <sup>m</sup>	74.0 <sup>°</sup> 2.7 <sup>'</sup>	4.13 <sup>h</sup> .10 <sup>m</sup>	65.6 <sup>°</sup> 1.2 <sup>'</sup>	42.05 <sup>h</sup> .08 <sup>m</sup>	29.0 <sup>°</sup> 0.0 <sup>'</sup>
27.4	23.90 <sup>h</sup> .16 <sup>m</sup>	50.4 <sup>°</sup> 1.3 <sup>'</sup>	30.00 <sup>h</sup> .33 <sup>m</sup>	76.6 <sup>°</sup> 2.3 <sup>'</sup>	4.02 <sup>h</sup> .13 <sup>m</sup>	66.6 <sup>°</sup> 0.9 <sup>'</sup>	41.96 <sup>h</sup> .11 <sup>m</sup>	29.1 <sup>°</sup> +0.2 <sup>'</sup>
Oct. 7.3	23.73 <sup>h</sup> .18 <sup>m</sup>	51.5 <sup>°</sup> 0.9 <sup>'</sup>	29.64 <sup>h</sup> .36 <sup>m</sup>	78.7 <sup>°</sup> 1.9 <sup>'</sup>	3.88 <sup>h</sup> .15 <sup>m</sup>	67.4 <sup>°</sup> 0.6 <sup>'</sup>	41.84 <sup>h</sup> .13 <sup>m</sup>	29.3 <sup>°</sup> 0.3 <sup>'</sup>
17.3	23.54 <sup>h</sup> .19 <sup>m</sup>	52.2 <sup>°</sup> 0.5 <sup>'</sup>	29.25 <sup>h</sup> .41 <sup>m</sup>	80.3 <sup>°</sup> 1.4 <sup>'</sup>	3.72 <sup>h</sup> .16 <sup>m</sup>	67.9 <sup>°</sup> +0.3 <sup>'</sup>	41.71 <sup>h</sup> .14 <sup>m</sup>	29.7 <sup>°</sup> 0.4 <sup>'</sup>
27.3	23.35 <sup>h</sup> .19 <sup>m</sup>	52.5 <sup>°</sup> +0.1 <sup>'</sup>	28.83 <sup>h</sup> .43 <sup>m</sup>	81.5 <sup>°</sup> 0.9 <sup>'</sup>	3.55 <sup>h</sup> .17 <sup>m</sup>	68.0 <sup>°</sup> 0.0 <sup>'</sup>	41.56 <sup>h</sup> .15 <sup>m</sup>	30.1 <sup>°</sup> 0.5 <sup>'</sup>
Nov. 6.3	23.15 <sup>h</sup> .19 <sup>m</sup>	52.5 <sup>°</sup> -0.3 <sup>'</sup>	28.39 <sup>h</sup> .43 <sup>m</sup>	82.2 <sup>°</sup> +0.4 <sup>'</sup>	3.38 <sup>h</sup> .17 <sup>m</sup>	67.8 <sup>°</sup> -0.3 <sup>'</sup>	41.41 <sup>h</sup> .15 <sup>m</sup>	30.6 <sup>°</sup> 0.6 <sup>'</sup>
16.2	22.97 <sup>h</sup> .18 <sup>m</sup>	52.0 <sup>°</sup> 0.7 <sup>'</sup>	27.96 <sup>h</sup> .43 <sup>m</sup>	82.2 <sup>°</sup> -0.2 <sup>'</sup>	3.22 <sup>h</sup> .16 <sup>m</sup>	67.3 <sup>°</sup> 0.7 <sup>'</sup>	41.27 <sup>h</sup> .14 <sup>m</sup>	31.2 <sup>°</sup> 0.6 <sup>'</sup>
26.2	22.79 <sup>h</sup> .16 <sup>m</sup>	51.1 <sup>°</sup> 1.1 <sup>'</sup>	27.54 <sup>h</sup> .41 <sup>m</sup>	81.7 <sup>°</sup> 0.8 <sup>'</sup>	3.07 <sup>h</sup> .14 <sup>m</sup>	66.5 <sup>°</sup> 1.0 <sup>'</sup>	41.14 <sup>h</sup> .12 <sup>m</sup>	31.9 <sup>°</sup> 0.7 <sup>'</sup>
Dec. 6.2	22.64 <sup>h</sup> .14 <sup>m</sup>	49.9 <sup>°</sup> 1.5 <sup>'</sup>	27.14 <sup>h</sup> .38 <sup>m</sup>	80.6 <sup>°</sup> 1.4 <sup>'</sup>	2.94 <sup>h</sup> .12 <sup>m</sup>	65.4 <sup>°</sup> 1.2 <sup>'</sup>	41.03 <sup>h</sup> .10 <sup>m</sup>	32.6 <sup>°</sup> 0.7 <sup>'</sup>
16.2	22.51 <sup>h</sup> .11 <sup>m</sup>	48.2 <sup>°</sup> 1.8 <sup>'</sup>	26.78 <sup>h</sup> .34 <sup>m</sup>	79.0 <sup>°</sup> 1.9 <sup>'</sup>	2.83 <sup>h</sup> .09 <sup>m</sup>	64.1 <sup>°</sup> 1.5 <sup>'</sup>	40.94 <sup>h</sup> .07 <sup>m</sup>	33.3 <sup>°</sup> 0.7 <sup>'</sup>
26.1	22.41 <sup>h</sup> .08 <sup>m</sup>	46.3 <sup>°</sup> 2.0 <sup>'</sup>	26.47 <sup>h</sup> .28 <sup>m</sup>	76.9 <sup>°</sup> 2.3 <sup>'</sup>	2.75 <sup>h</sup> .07 <sup>m</sup>	62.5 <sup>°</sup> 1.7 <sup>'</sup>	40.83 <sup>h</sup> .05 <sup>m</sup>	34.0 <sup>°</sup> 0.7 <sup>'</sup>
36.1	22.35 <sup>h</sup> -05 <sup>m</sup>	44.2 <sup>°</sup> -2.3 <sup>'</sup>	26.21 <sup>h</sup> -22 <sup>m</sup>	74.3 <sup>°</sup> -2.7 <sup>'</sup>	2.70 <sup>h</sup> -04 <sup>m</sup>	60.7 <sup>°</sup> -1.8 <sup>'</sup>	40.85 <sup>h</sup> -02 <sup>m</sup>	34.7 <sup>°</sup> +0.7 <sup>'</sup>

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	* $\beta$ Cephei.		$\xi$ Aquarii.		$\epsilon$ Pegasi.		*11 Cephei.	
	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> <sup>m</sup> 21 26	<sup>°</sup> <sup>'</sup> 69 58	<sup>h</sup> <sup>m</sup> 21 30	<sup>°</sup> <sup>'</sup> 8 26	<sup>h</sup> <sup>m</sup> 21 37	<sup>°</sup> <sup>'</sup> 9 16	<sup>h</sup> <sup>m</sup> 21 39	<sup>°</sup> <sup>'</sup> 70 42
Jan. 1.1	<sup>s</sup> 55.46 -41	<sup>"</sup> 81.6 -2.5	<sup>s</sup> 44.80 -04	<sup>"</sup> 27.6 +0.6	<sup>s</sup> 43.57 -05	<sup>"</sup> 33.8 -1.3	<sup>s</sup> 57.67 -45	<sup>"</sup> 43.7 -2.3
11.1	55.10 .31	78.9 2.8	44.78 -.01	28.1 0.5	43.53 -.02	32.4 1.4	57.27 .36	41.2 2.7
21.1	54.84 .21	75.9 3.1	44.78 +.02	28.6 0.4	43.52 .00	31.0 1.4	56.96 .25	38.2 3.0
31.0	54.69 -.10	72.7 3.3	44.82 .05	28.9 0.3	43.54 +.03	29.7 1.3	56.76 .14	35.1 3.3
Feb. 10.0	54.64 +.01	69.3 3.3	44.89 .08	29.2 +0.3	43.59 .07	28.4 1.2	56.68 -.03	31.7 3.3
20.0	54.72 .13	66.0 3.3	44.99 .11	29.2 0.0	43.67 .10	27.3 1.0	56.71 +.09	28.4 3.3
Mar. 1.9	54.90 .24	62.8 3.0	45.12 .14	29.1 -0.2	43.78 .13	26.4 0.8	56.87 .21	25.2 3.1
11.9	55.20 .35	59.9 2.7	45.28 .17	28.7 0.5	43.93 .16	25.8 0.5	57.15 .33	22.2 2.8
21.9	55.61 .45	57.4 2.3	45.47 .20	28.2 0.7	44.11 .19	25.5 -0.2	57.53 .43	19.6 2.4
31.9	56.10 .53	55.4 1.8	45.68 .23	27.4 0.9	44.32 .22	25.5 +0.2	58.01 .52	17.5 1.9
Apr. 10.8	56.66 .59	53.9 1.2	45.93 .26	26.4 1.1	44.55 .25	25.8 0.5	58.57 .59	15.8 1.3
20.8	57.28 .64	53.0 -0.6	46.19 .28	25.1 1.3	44.81 .27	26.5 0.9	59.20 .65	14.8 0.7
30.8	57.94 .66	52.7 0.0	46.48 .29	23.8 1.5	45.09 .29	27.6 1.2	59.87 .68	14.3 -0.1
May 10.8	58.61 .67	53.1 +0.7	46.78 .30	22.2 1.6	45.38 .30	28.9 1.5	60.56 .69	14.5 +0.5
20.7	59.28 .66	54.1 1.3	47.08 .31	20.6 1.6	45.69 .30	30.5 1.7	61.26 .69	15.3 1.1
30.7	59.92 .62	55.6 1.8	47.39 .30	19.0 1.6	45.99 .30	32.4 1.9	61.93 .65	16.7 1.6
June 9.7	60.52 .57	57.7 2.3	47.69 .29	17.3 1.6	46.28 .29	34.4 2.0	62.56 .61	18.6 2.1
19.6	61.05 .50	60.2 2.7	47.98 .28	15.7 1.6	46.56 .27	36.5 2.1	63.14 .54	21.0 2.6
29.6	61.52 .42	63.0 3.0	48.24 .25	14.2 1.4	46.82 .24	38.6 2.1	63.64 .46	23.8 3.0
July 9.6	61.89 .32	66.2 3.3	48.47 .22	12.8 1.3	47.05 .21	40.7 2.1	64.06 .37	26.9 3.3
19.6	62.17 .22	69.7 3.5	48.67 .18	11.6 1.1	47.24 .18	42.8 2.0	64.38 .27	30.3 3.5
29.5	62.34 .12	73.2 3.6	48.84 .14	10.6 0.9	47.40 .14	44.7 1.9	64.59 .16	33.8 3.6
Aug. 8.5	62.41 +.01	76.9 3.6	48.95 .09	9.9 0.7	47.52 .09	46.5 1.7	64.70 +.05	37.5 3.6
18.5	62.37 -.09	80.5 3.6	49.02 .05	9.3 0.5	47.58 +.05	48.1 1.5	64.69 -.06	41.1 3.6
28.5	62.22 .19	84.0 3.4	49.05 +.01	8.9 0.3	47.61 .00	49.5 1.3	64.58 .16	44.7 3.5
Sept. 7.4	61.98 .29	87.3 3.2	49.03 -.03	8.8 -0.1	47.59 -.04	50.7 1.1	64.37 .26	48.1 3.3
17.4	61.64 .38	90.4 2.9	48.98 .07	8.8 +0.1	47.54 .07	51.6 0.8	64.06 .36	51.4 3.1
27.4	61.23 .45	93.2 2.6	48.89 .10	9.0 0.3	47.45 .10	52.3 0.6	63.66 .44	54.3 2.8
Oct. 7.3	60.74 .52	95.6 2.2	48.78 .13	9.3 0.4	47.34 .12	52.8 0.3	63.19 .51	56.9 2.4
17.3	60.19 .57	97.6 1.7	48.64 .14	9.7 0.5	47.20 .14	53.0 +0.1	62.65 .56	59.0 1.9
27.3	59.61 .60	99.1 1.2	48.50 .15	10.2 0.5	47.06 .15	52.9 -0.2	62.06 .61	60.7 1.4
Nov. 6.3	58.99 .62	100.1 0.7	48.35 .14	10.8 0.6	46.91 .15	52.7 0.4	61.43 .63	61.9 0.9
16.2	58.37 .62	100.4 +0.1	48.21 .14	11.4 0.6	46.76 .14	52.2 0.6	60.80 .64	62.5 +0.3
26.2	57.75 .60	100.2 -0.5	48.08 .12	12.1 0.6	46.62 .13	51.5 0.6	60.16 .63	62.4 -0.3
Dec. 6.2	57.16 .57	99.4 1.1	47.97 .10	12.7 0.6	46.50 .11	50.7 1.0	59.54 .60	61.9 0.9
16.2	56.61 .52	98.0 1.6	47.88 .08	13.3 0.6	46.40 .09	49.5 1.1	58.95 .56	60.7 1.5
26.1	56.12 .45	96.1 2.2	47.81 .05	14.0 0.6	46.32 .07	48.3 1.3	58.43 .49	58.9 2.0
36.1	55.71 -.37	93.7 -2.6	47.78 -.02	14.5 +0.5	46.27 -.04	47.0 -1.3	57.97 -.41	56.7 -2.5

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\mu$ Capricorni.		*79 Draconis.		$\alpha$ Aquarii.		$\alpha$ Gruis.	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 21 <sup>m</sup> 46	<sup>°</sup> 14 <sup>'</sup> 9	<sup>h</sup> 21 <sup>m</sup> 51	<sup>°</sup> 73 <sup>'</sup> 4	<sup>h</sup> 21 <sup>m</sup> 59	<sup>°</sup> 0 <sup>'</sup> 57	<sup>h</sup> 21 <sup>m</sup> 59	<sup>°</sup> 47 <sup>'</sup> 35
Jan. 1.1	7.35 <sup>s</sup> -05	66.2 <sup>"</sup> +0.3	12.28 <sup>s</sup> -54	71.6 <sup>"</sup> -2.2	1.71 <sup>s</sup> -06	20.0 <sup>"</sup> +0.9	55.32 <sup>s</sup> -11	49.7 <sup>"</sup> -1.2
11.1	7.32 <sup>s</sup> -02	66.4 <sup>"</sup> 0.2	11.78 <sup>s</sup> .45	69.2 <sup>"</sup> 2.6	1.67 <sup>s</sup> .03	20.9 <sup>"</sup> 0.8	55.24 <sup>s</sup> .06	48.3 <sup>"</sup> 1.5
21.1	7.32 <sup>s</sup> +0.1	66.6 <sup>"</sup> +0.1	11.39 <sup>s</sup> .33	66.4 <sup>"</sup> 3.0	1.65 <sup>s</sup> -0.1	21.7 <sup>"</sup> 0.8	55.20 <sup>s</sup> -0.2	46.7 <sup>"</sup> 1.8
31.0	7.34 <sup>s</sup> .04	66.6 <sup>"</sup> -0.1	11.11 <sup>s</sup> .21	63.3 <sup>"</sup> 3.2	1.65 <sup>s</sup> +0.2	22.4 <sup>"</sup> 0.7	55.20 <sup>s</sup> +0.3	44.7 <sup>"</sup> 2.1
Feb. 10.0	7.40 <sup>s</sup> .07	66.4 <sup>"</sup> 0.3	10.97 <sup>s</sup> -0.8	60.0 <sup>"</sup> 3.3	1.69 <sup>s</sup> .05	23.0 <sup>"</sup> 0.5	55.25 <sup>s</sup> .07	42.6 <sup>"</sup> 2.2
20.0	7.48 <sup>s</sup> .10	66.0 <sup>"</sup> 0.4	10.96 <sup>s</sup> +0.6	56.7 <sup>"</sup> 3.3	1.75 <sup>s</sup> .08	23.5 <sup>"</sup> 0.4	55.34 <sup>s</sup> .12	40.2 <sup>"</sup> 2.4
Mar. 2.0	7.60 <sup>s</sup> .13	65.5 <sup>"</sup> 0.6	11.10 <sup>s</sup> .20	53.4 <sup>"</sup> 3.2	1.85 <sup>s</sup> .11	23.8 <sup>"</sup> +0.2	55.48 <sup>s</sup> .16	37.8 <sup>"</sup> 2.5
11.9	7.75 <sup>s</sup> .17	64.8 <sup>"</sup> 0.8	11.36 <sup>s</sup> .33	50.4 <sup>"</sup> 2.9	1.98 <sup>s</sup> .14	23.8 <sup>"</sup> -0.1	55.67 <sup>s</sup> .21	35.3 <sup>"</sup> 2.5
21.9	7.93 <sup>s</sup> .20	63.9 <sup>"</sup> 1.0	11.76 <sup>s</sup> .45	47.6 <sup>"</sup> 2.5	2.14 <sup>s</sup> .18	23.6 <sup>"</sup> 0.4	55.89 <sup>s</sup> .25	32.8 <sup>"</sup> 2.5
31.9	8.14 <sup>s</sup> .22	62.8 <sup>"</sup> 1.2	12.27 <sup>s</sup> .56	45.3 <sup>"</sup> 2.0	2.33 <sup>s</sup> .21	23.1 <sup>"</sup> 0.6	56.17 <sup>s</sup> .29	30.3 <sup>"</sup> 2.4
Apr. 10.9	8.38 <sup>s</sup> .25	61.5 <sup>"</sup> 1.3	12.88 <sup>s</sup> .65	43.6 <sup>"</sup> 1.5	2.55 <sup>s</sup> .23	22.3 <sup>"</sup> 0.9	56.48 <sup>s</sup> .33	27.9 <sup>"</sup> 2.3
20.8	8.64 <sup>s</sup> .27	60.1 <sup>"</sup> 1.5	13.56 <sup>s</sup> .71	42.3 <sup>"</sup> 0.9	2.80 <sup>s</sup> .26	21.3 <sup>"</sup> 1.2	56.82 <sup>s</sup> .36	25.7 <sup>"</sup> 2.2
30.8	8.93 <sup>s</sup> .29	58.6 <sup>"</sup> 1.6	14.30 <sup>s</sup> .76	41.7 <sup>"</sup> -0.3	3.07 <sup>s</sup> .28	20.0 <sup>"</sup> 1.4	57.20 <sup>s</sup> .39	23.6 <sup>"</sup> 2.0
May 10.8	9.23 <sup>s</sup> .31	57.0 <sup>"</sup> 1.6	15.08 <sup>s</sup> .78	41.7 <sup>"</sup> +0.3	3.36 <sup>s</sup> .29	18.5 <sup>"</sup> 1.6	57.60 <sup>s</sup> .41	21.8 <sup>"</sup> 1.7
20.7	9.54 <sup>s</sup> .31	55.3 <sup>"</sup> 1.7	15.85 <sup>s</sup> .77	42.3 <sup>"</sup> 0.9	3.66 <sup>s</sup> .30	16.8 <sup>"</sup> 1.7	58.02 <sup>s</sup> .42	20.2 <sup>"</sup> 1.4
30.7	9.86 <sup>s</sup> .31	53.6 <sup>"</sup> 1.6	16.62 <sup>s</sup> .74	43.5 <sup>"</sup> 1.5	3.96 <sup>s</sup> .30	15.0 <sup>"</sup> 1.8	58.44 <sup>s</sup> .42	18.9 <sup>"</sup> 1.1
June 9.7	10.17 <sup>s</sup> .31	52.0 <sup>"</sup> 1.5	17.34 <sup>s</sup> .69	45.3 <sup>"</sup> 2.0	4.26 <sup>s</sup> .30	13.2 <sup>"</sup> 1.9	58.87 <sup>s</sup> .42	18.0 <sup>"</sup> 0.7
19.7	10.47 <sup>s</sup> .29	50.6 <sup>"</sup> 1.4	18.00 <sup>s</sup> .62	47.5 <sup>"</sup> 2.5	4.55 <sup>s</sup> .28	11.3 <sup>"</sup> 1.9	59.27 <sup>s</sup> .40	17.5 <sup>"</sup> -0.3
29.6	10.75 <sup>s</sup> .27	49.2 <sup>"</sup> 1.3	18.58 <sup>s</sup> .54	50.2 <sup>"</sup> 2.8	4.83 <sup>s</sup> .26	9.4 <sup>"</sup> 1.8	59.66 <sup>s</sup> .37	17.4 <sup>"</sup> 0.0
July 9.6	11.00 <sup>s</sup> .24	48.0 <sup>"</sup> 1.1	19.07 <sup>s</sup> .43	53.2 <sup>"</sup> 3.2	5.08 <sup>s</sup> .23	7.7 <sup>"</sup> 1.7	60.01 <sup>s</sup> .33	17.6 <sup>"</sup> +0.4
19.6	11.22 <sup>s</sup> .20	47.1 <sup>"</sup> 0.9	19.45 <sup>s</sup> .32	56.5 <sup>"</sup> 3.4	5.29 <sup>s</sup> .20	6.1 <sup>"</sup> 1.6	60.32 <sup>s</sup> .29	18.2 <sup>"</sup> 0.8
29.6	11.40 <sup>s</sup> .16	46.3 <sup>"</sup> 0.6	19.72 <sup>s</sup> .21	60.0 <sup>"</sup> 3.6	5.47 <sup>s</sup> .16	4.6 <sup>"</sup> 1.4	60.58 <sup>s</sup> .23	19.2 <sup>"</sup> 1.2
Aug. 8.5	11.53 <sup>s</sup> .11	45.8 <sup>"</sup> 0.4	19.87 <sup>s</sup> +0.09	63.6 <sup>"</sup> 3.7	5.61 <sup>s</sup> .12	3.3 <sup>"</sup> 1.2	60.78 <sup>s</sup> .17	20.5 <sup>"</sup> 1.5
18.5	11.62 <sup>s</sup> .07	45.6 <sup>"</sup> -0.2	19.89 <sup>s</sup> -0.4	67.3 <sup>"</sup> 3.7	5.70 <sup>s</sup> .07	2.2 <sup>"</sup> 1.0	60.93 <sup>s</sup> .11	22.1 <sup>"</sup> 1.7
28.5	11.67 <sup>s</sup> +0.2	45.5 <sup>"</sup> +0.1	19.79 <sup>s</sup> .16	70.9 <sup>"</sup> 3.6	5.75 <sup>s</sup> +0.3	1.4 <sup>"</sup> 0.7	61.00 <sup>s</sup> +0.4	23.9 <sup>"</sup> 1.9
Sept. 7.4	11.67 <sup>s</sup> -0.2	45.7 <sup>"</sup> 0.2	19.58 <sup>s</sup> .27	74.4 <sup>"</sup> 3.4	5.76 <sup>s</sup> -0.1	0.7 <sup>"</sup> 0.5	61.01 <sup>s</sup> -0.2	25.9 <sup>"</sup> 2.0
17.4	11.63 <sup>s</sup> .06	46.0 <sup>"</sup> 0.4	19.25 <sup>s</sup> .36	77.8 <sup>"</sup> 3.2	5.73 <sup>s</sup> .05	0.3 <sup>"</sup> 0.3	60.96 <sup>s</sup> .06	27.8 <sup>"</sup> 2.0
27.4	11.55 <sup>s</sup> .09	46.5 <sup>"</sup> 0.5	18.83 <sup>s</sup> .47	80.8 <sup>"</sup> 2.9	5.67 <sup>s</sup> .08	0.1 <sup>"</sup> -0.1	60.86 <sup>s</sup> .13	29.8 <sup>"</sup> 1.9
Oct. 7.4	11.45 <sup>s</sup> .12	47.1 <sup>"</sup> 0.6	18.31 <sup>s</sup> .55	83.6 <sup>"</sup> 2.5	5.57 <sup>s</sup> .11	0.1 <sup>"</sup> +0.1	60.71 <sup>s</sup> .17	31.7 <sup>"</sup> 1.8
17.3	11.32 <sup>s</sup> .13	47.7 <sup>"</sup> 0.7	17.72 <sup>s</sup> .62	85.9 <sup>"</sup> 2.1	5.46 <sup>s</sup> .12	0.3 <sup>"</sup> 0.2	60.52 <sup>s</sup> .20	33.4 <sup>"</sup> 1.6
27.3	11.18 <sup>s</sup> .14	48.4 <sup>"</sup> 0.7	17.06 <sup>s</sup> .68	87.8 <sup>"</sup> 1.6	5.33 <sup>s</sup> .13	0.6 <sup>"</sup> 0.4	60.30 <sup>s</sup> .22	34.8 <sup>"</sup> 1.3
Nov. 6.3	11.03 <sup>s</sup> .14	49.1 <sup>"</sup> 0.7	16.36 <sup>s</sup> .71	89.1 <sup>"</sup> 1.1	5.19 <sup>s</sup> .14	1.0 <sup>"</sup> 0.5	60.08 <sup>s</sup> .23	35.9 <sup>"</sup> 0.9
16.3	10.89 <sup>s</sup> .14	49.7 <sup>"</sup> 0.6	15.64 <sup>s</sup> .73	90.0 <sup>"</sup> +0.5	5.05 <sup>s</sup> .13	1.6 <sup>"</sup> 0.6	59.84 <sup>s</sup> .23	36.6 <sup>"</sup> 0.6
26.2	10.76 <sup>s</sup> .13	50.4 <sup>"</sup> 0.6	14.90 <sup>s</sup> .73	90.2 <sup>"</sup> -0.1	4.92 <sup>s</sup> .12	2.3 <sup>"</sup> 0.7	59.62 <sup>s</sup> .21	37.0 <sup>"</sup> +0.2
Dec. 6.2	10.64 <sup>s</sup> .11	50.9 <sup>"</sup> 0.5	14.18 <sup>s</sup> .70	89.8 <sup>"</sup> 0.7	4.80 <sup>s</sup> .11	3.0 <sup>"</sup> 0.8	59.42 <sup>s</sup> .19	37.0 <sup>"</sup> -0.2
16.2	10.54 <sup>s</sup> .09	51.4 <sup>"</sup> 0.4	13.50 <sup>s</sup> .66	88.8 <sup>"</sup> 1.3	4.70 <sup>s</sup> .09	3.8 <sup>"</sup> 0.8	59.24 <sup>s</sup> .16	36.6 <sup>"</sup> 0.6
26.1	10.47 <sup>s</sup> .06	51.8 <sup>"</sup> 0.4	12.87 <sup>s</sup> .59	87.3 <sup>"</sup> 1.8	4.62 <sup>s</sup> .07	4.7 <sup>"</sup> 0.9	59.09 <sup>s</sup> .13	35.7 <sup>"</sup> 1.0
36.1	10.42 <sup>s</sup> -0.3	52.1 <sup>"</sup> +0.2	12.31 <sup>s</sup> -51	85.2 <sup>"</sup> -2.3	4.56 <sup>s</sup> -0.5	5.5 <sup>"</sup> +0.9	58.90 <sup>s</sup> -0.9	34.6 <sup>"</sup> -1.2

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\theta$ Aquarii.		$\pi$ Aquarii.		$\eta$ Aquarii.		*226 Cephei (B).	
	Right Ascension.	Declination South.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination North.
	<sup>h</sup> 22 <sup>m</sup> 9	<sup>°</sup> 8 <sup>'</sup> 25	<sup>h</sup> 22 <sup>m</sup> 18	<sup>°</sup> 0 <sup>'</sup> 42	<sup>h</sup> 22 <sup>m</sup> 28	<sup>°</sup> 0 <sup>'</sup> 47	<sup>h</sup> 22 <sup>m</sup> 29	<sup>°</sup> 75 <sup>'</sup> 32
Jan. 1.2	53.57 -.07	68.7 +0.5	33.72 -.07	46.1 -0.9	36.01 -.08	33.7 +0.8	56.41 -.72	79.8 -1.7
11.1	53.52 .04	69.1 0.4	33.66 .05	45.2 0.9	35.95 .06	34.5 0.8	55.72 .63	77.9 2.2
21.1	53.49 -.01	69.5 0.4	33.62 -.03	44.3 0.8	35.90 .03	35.3 0.7	55.14 .52	75.5 2.6
31.1	53.49 +.01	69.8 0.2	33.61 .00	43.6 0.7	35.88 -.01	36.0 0.6	54.68 .39	72.7 2.9
Feb. 10.0	53.52 .04	70.0 +0.1	33.63 +.03	42.9 0.6	35.89 +.02	36.5 0.5	54.36 .24	69.6 3.2
20.0	53.58 .07	70.0 -0.1	33.67 .06	42.3 0.4	35.92 .03	36.9 0.3	54.20 -.09	66.4 3.3
Mar. 2.0	53.66 .11	69.8 0.3	33.75 .09	42.0 -0.2	35.99 .08	37.2 +0.1	54.19 +.08	63.1 3.2
12.0	53.79 .14	69.3 0.5	33.85 .13	41.9 0.0	36.09 .11	37.2 -0.1	54.35 .24	59.9 3.1
21.9	53.94 .17	68.7 0.8	34.00 .16	42.1 +0.3	36.22 .15	36.9 0.4	54.67 .40	56.9 2.8
31.9	54.12 .20	67.8 1.0	34.17 .19	42.5 0.6	36.39 .18	36.4 0.6	55.14 .53	54.3 2.4
Apr. 10.9	54.34 .23	66.7 1.2	34.38 .22	43.2 0.8	36.59 .21	35.6 0.9	55.74 .66	52.1 2.0
20.9	54.59 .26	65.4 1.4	34.61 .25	44.2 1.1	36.81 .24	34.6 1.2	56.45 .75	50.4 1.4
30.8	54.85 .28	63.9 1.6	34.87 .27	45.4 1.4	37.07 .27	33.3 1.4	57.25 .83	49.3 0.8
May 10.8	55.14 .30	62.2 1.7	35.15 .29	46.9 1.6	37.35 .29	31.8 1.6	58.11 .88	48.8 -0.2
20.8	55.44 .31	60.5 1.8	35.45 .30	48.6 1.7	37.64 .30	30.1 1.8	59.00 .90	48.8 +0.4
30.7	55.75 .31	58.7 1.8	35.76 .31	50.4 1.9	37.95 .31	28.2 1.9	59.90 .89	49.5 1.0
June 9.7	56.06 .31	56.9 1.8	36.06 .30	52.3 1.9	38.26 .30	26.4 1.9	60.77 .85	50.7 1.5
19.7	56.36 .29	55.2 1.7	36.36 .29	54.2 1.9	38.56 .29	24.4 1.9	61.60 .79	52.5 2.0
29.7	56.65 .27	53.6 1.6	36.64 .27	56.2 1.9	38.85 .28	22.5 1.9	62.36 .71	54.8 2.5
July 9.6	56.91 .24	52.1 1.4	36.90 .24	58.0 1.8	39.11 .25	20.7 1.8	63.03 .61	57.5 2.9
19.6	57.14 .21	50.8 1.2	37.13 .21	59.8 1.7	39.35 .22	19.0 1.6	63.59 .50	60.5 3.2
29.6	57.33 .17	49.6 1.0	37.32 .17	61.3 1.5	39.55 .18	17.5 1.4	64.03 .38	63.8 3.4
Aug. 8.6	57.48 .13	48.7 0.8	37.48 .13	62.8 1.3	39.71 .14	16.1 1.2	64.34 .24	67.4 3.6
18.5	57.59 .09	48.1 0.5	37.59 .09	64.0 1.1	39.84 .10	15.0 1.0	64.51 +.11	71.0 3.7
28.5	57.66 +.04	47.7 0.3	37.66 .05	64.9 0.9	39.91 .06	14.1 0.8	64.55 -.03	74.7 3.7
Sept. 7.5	57.68 .00	47.5 -0.1	37.69 +.01	65.7 0.6	39.95 +.02	13.4 0.6	64.45 .16	78.4 3.6
17.4	57.66 -.04	47.5 +0.1	37.68 -.03	66.2 0.4	39.95 -.02	12.9 0.4	64.22 .29	82.0 3.5
27.4	57.61 .07	47.7 0.3	37.63 .06	66.5 +0.2	39.91 .05	12.7 -0.1	63.86 .41	85.4 3.3
Oct. 7.4	57.52 .10	48.0 0.4	37.55 .09	66.7 0.0	39.84 .08	12.7 +0.1	63.39 .53	88.6 3.0
17.4	57.41 .12	48.5 0.5	37.45 .11	66.6 -0.2	39.75 .10	12.8 0.2	62.81 .62	91.4 2.6
27.3	57.29 .13	49.0 0.6	37.33 .13	66.4 0.3	39.64 .12	13.1 0.4	62.15 .70	93.8 2.2
Nov. 6.3	57.15 .14	49.7 0.6	37.20 .13	66.0 0.5	39.51 .13	13.6 0.5	61.41 .77	95.7 1.7
16.3	57.02 .13	50.3 0.7	37.06 .13	65.4 0.6	39.38 .13	14.1 0.6	60.61 .81	97.2 1.1
26.3	56.89 .13	51.0 0.7	36.94 .13	64.8 0.7	39.25 .12	14.7 0.7	59.78 .84	98.0 +0.6
Dec. 6.2	56.77 .11	51.7 0.7	36.81 .12	64.0 0.8	39.13 .12	15.5 0.8	58.93 .84	98.3 -0.1
16.2	56.66 .09	52.3 0.6	36.70 .10	63.2 0.8	39.02 .10	16.2 0.8	58.09 .82	97.9 0.7
26.2	56.58 .08	52.9 0.6	36.61 .08	62.4 0.9	38.93 .09	17.0 0.8	57.29 .77	96.9 1.3
36.1	56.51 -.05	53.5 +0.5	36.54 -.06	61.5 -0.9	38.85 -.07	17.9 +0.8	56.56 -.70	95.4 -1.8

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	ζ Pegasi.		* Cephei.		λ Aquarii.		α Piscis Australis. (Fomalhaut.)	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination South.	Right Ascension.	Declination South.
	<sup>h</sup> 22 <sup>m</sup> 34	<sup>°</sup> 10 <sup>'</sup> 8	<sup>h</sup> 22 <sup>m</sup> 44	<sup>°</sup> 65 <sup>'</sup> 30	<sup>h</sup> 22 <sup>m</sup> 45	<sup>°</sup> 8 <sup>'</sup> 16	<sup>h</sup> 22 <sup>m</sup> 50	<sup>°</sup> 30 <sup>'</sup> 18
Jan. 1.2	54.39 -09	54.2 -1.1	60.25 -41	56.0 -1.6	45.25 -09	39.6 +0.6	22.67 -10	69.2 -0.3
11.1	54.31 .07	53.0 1.9	59.87 .36	54.2 2.1	45.17 .07	40.1 0.5	22.57 .08	68.9 0.5
21.1	54.25 .05	51.8 1.2	59.53 .30	51.9 2.5	45.11 .04	40.5 0.3	22.50 .06	68.2 0.8
31.1	54.22 -09	50.6 1.9	59.27 .23	49.2 2.8	45.08 -09	40.8 +0.2	22.46 -03	67.3 1.0
Feb. 10.1	54.22 +01	49.4 1.1	59.08 .15	46.2 3.0	45.07 +01	40.9 0.0	22.45 .00	66.2 1.3
20.0	54.24 .04	48.3 1.0	58.98 -06	43.1 3.1	45.09 .04	40.9 -0.2	22.47 +04	64.8 1.5
Mar. 2.0	54.30 .07	47.5 0.8	58.97 +04	40.0 3.1	45.15 .07	40.6 0.4	22.52 .07	63.2 1.7
12.0	54.38 .10	46.8 0.5	59.05 .13	37.0 3.0	45.23 .10	40.1 0.6	22.61 .11	61.4 1.9
22.0	54.51 .14	46.4 -0.2	59.23 .23	34.1 2.7	45.35 .13	39.4 0.8	22.74 .15	59.4 2.0
31.9	54.67 .18	46.4 +0.1	59.51 .32	31.6 2.3	45.50 .17	38.5 1.1	22.90 .18	57.3 2.1
Apr. 10.9	54.86 .31	46.6 0.4	59.86 .39	29.5 1.8	45.68 .20	37.3 1.3	23.11 .22	55.2 2.2
20.9	55.09 .24	47.2 0.8	60.30 .46	27.9 1.3	45.91 .23	35.9 1.5	23.35 .26	53.0 2.2
30.8	55.35 .27	48.1 1.1	60.79 .52	26.9 0.8	46.15 .26	34.3 1.6	23.62 .29	50.7 2.2
May 10.8	55.62 .29	49.4 1.4	61.33 .55	26.4 -0.2	46.43 .28	32.6 1.8	23.92 .31	48.6 2.1
20.8	55.92 .30	50.9 1.6	61.89 .57	26.5 +0.4	46.72 .30	30.8 1.8	24.25 .33	46.5 2.0
30.8	56.23 .31	52.6 1.8	62.48 .58	27.2 1.0	47.03 .31	28.9 1.9	24.59 .35	44.6 1.8
June 9.7	56.53 .30	54.6 2.0	63.05 .57	28.5 1.5	47.34 .31	27.0 1.9	24.94 .35	42.9 1.6
19.7	56.83 .30	56.7 2.1	63.61 .54	30.3 2.0	47.65 .30	25.2 1.8	25.28 .34	41.4 1.3
29.7	57.12 .28	58.8 2.2	64.12 .49	32.5 2.5	47.95 .29	23.4 1.7	25.62 .33	40.2 1.0
July 9.7	57.39 .25	61.0 2.1	64.59 .44	35.2 2.8	48.22 .28	21.8 1.5	25.94 .30	39.3 0.7
19.6	57.63 .22	63.1 2.1	65.00 .37	38.2 3.1	48.48 .24	20.4 1.3	26.23 .27	38.8 -0.4
29.6	57.83 .19	65.1 2.0	65.34 .30	41.4 3.4	48.70 .20	19.1 1.1	26.48 .24	38.6 0.0
Aug. 8.6	58.00 .14	67.0 1.8	65.59 .22	44.9 3.5	48.88 .16	18.1 0.9	26.70 .19	38.8 +0.3
18.5	58.12 .10	68.8 1.6	65.77 .13	48.5 3.6	49.02 .12	17.4 0.6	26.87 .15	39.3 0.6
28.5	58.20 .06	70.3 1.4	65.86 +05	52.1 3.6	49.12 .08	16.9 0.4	26.99 .10	40.0 0.9
Sept. 7.5	58.24 +02	71.7 1.2	65.86 -04	55.7 3.5	49.18 +04	16.6 -0.1	27.06 +05	41.1 1.1
17.5	58.24 -02	72.7 1.0	65.78 .12	59.2 3.4	49.19 .00	16.6 +0.1	27.08 .00	42.3 1.3
27.4	58.21 .05	73.6 0.7	65.63 .19	62.5 3.2	49.17 -04	16.8 0.3	27.06 -04	43.7 1.4
Oct. 7.4	58.14 .08	74.2 0.5	65.40 .26	65.5 2.9	49.12 .07	17.1 0.4	27.00 .08	45.1 1.5
17.4	58.05 .10	74.6 +0.3	65.11 .32	68.2 2.5	49.04 .09	17.6 0.5	26.90 .11	46.6 1.4
27.4	57.93 .12	74.8 0.0	64.76 .37	70.6 2.1	48.93 .11	18.2 0.6	26.78 .13	48.0 1.4
Nov. 6.3	57.81 .13	74.7 -0.2	64.37 .41	72.4 1.6	48.82 .12	18.9 0.7	26.64 .15	49.3 1.2
16.3	57.68 .13	74.4 0.4	63.94 .44	73.8 1.1	48.69 .13	19.6 0.7	26.49 .15	50.4 1.0
26.3	57.54 .12	73.9 0.6	63.50 .46	74.6 +0.5	48.57 .12	20.3 0.7	26.34 .15	51.3 0.8
Dec. 6.2	57.42 .12	73.2 0.8	63.03 .46	74.9 -0.1	48.44 .12	21.1 0.7	26.19 .15	52.0 0.5
16.2	57.30 .11	72.3 0.9	62.58 .45	74.5 0.7	48.33 .11	21.8 0.6	26.05 .13	52.4 +0.2
26.2	57.19 .10	71.3 1.1	62.13 .43	73.6 1.2	48.23 .09	22.4 0.5	25.92 .12	52.5 -0.1
36.2	57.11 -08	70.2 -1.1	61.72 -39	72.1 -1.7	48.14 -07	22.9 +0.4	25.82 -10	52.3 -0.3

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	$\alpha$ Pegasi. (Markab.)		$\gamma$ Cephei.		$\theta$ Piscium.		$\iota$ Piscium.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 22 <sup>m</sup> 56	<sup>°</sup> 14 <sup>'</sup> 29	<sup>h</sup> 23 <sup>m</sup> 13	<sup>°</sup> 67 <sup>'</sup> 23	<sup>h</sup> 23 <sup>m</sup> 21	<sup>°</sup> 5 <sup>'</sup> 39	<sup>h</sup> 23 <sup>m</sup> 33	<sup>°</sup> 4 <sup>'</sup> 54
Jan. 1.2	13.06 <sup>s</sup> -10	65.6 <sup>"</sup> -1.1	14.73 <sup>s</sup> -47	55.0 <sup>"</sup> -1.2	18.29 <sup>s</sup> -10	31.4 <sup>"</sup> -0.9	11.79 <sup>s</sup> -11	55.6 <sup>"</sup> -0.9
11.2	12.96 .09	64.4 1.3	14.28 .43	53.5 1.7	18.19 .09	30.5 0.9	11.69 .10	54.8 0.9
21.1	12.88 .07	63.1 1.3	13.87 .37	51.5 2.2	18.11 .08	29.6 0.9	11.60 .08	53.9 0.9
31.1	12.83 .04	61.7 1.3	13.53 .31	49.2 2.6	18.04 .08	28.7 0.9	11.53 .08	53.0 0.8
Feb. 10.1	12.80 -.02	60.4 1.3	13.26 .23	46.4 2.9	17.99 -.03	27.9 0.8	11.47 .04	52.3 0.7
20.1	12.79 +.01	59.2 1.2	13.08 .13	43.4 3.0	17.97 .00	27.2 0.6	11.44 -.02	51.6 0.6
Mar. 2.0	12.82 .05	58.1 1.0	13.00 -.03	40.3 3.1	17.99 +.03	26.7 0.5	11.44 +.02	51.1 0.4
12.0	12.89 .08	57.2 0.8	13.01 +.07	37.3 3.0	18.03 .06	26.3 -0.2	11.48 .05	50.8 -0.2
22.0	12.99 .12	56.6 0.5	13.14 .18	34.3 2.8	18.11 .10	26.2 0.0	11.54 .09	50.7 +0.1
Apr. 1.0	13.13 .16	56.2 -0.2	13.37 .28	31.6 2.5	18.22 .14	26.4 +0.3	11.65 .12	51.0 0.3
10.9	13.31 .19	56.2 +0.2	13.69 .37	29.3 2.1	18.38 .17	26.8 0.6	11.79 .16	51.4 0.6
20.9	13.52 .23	56.6 0.5	14.10 .45	27.4 1.6	18.57 .21	27.6 0.9	11.97 .20	52.2 0.9
30.9	13.76 .26	57.3 0.9	14.59 .52	26.0 1.1	18.79 .24	28.6 1.2	12.19 .23	53.2 1.3
May 10.8	14.04 .28	58.3 1.2	15.14 .57	25.2 -0.6	19.04 .27	29.9 1.4	12.44 .26	54.5 1.4
20.8	14.32 .30	59.7 1.5	15.74 .61	24.9 0.0	19.32 .29	31.5 1.6	12.71 .28	56.1 1.6
30.8	14.63 .31	61.3 1.8	16.35 .62	25.2 +0.6	19.62 .30	33.2 1.8	13.00 .30	57.8 1.9
June 9.8	14.95 .31	63.2 2.0	16.98 .62	26.1 1.2	19.92 .31	35.1 2.0	13.31 .31	59.7 1.9
19.7	15.26 .30	65.3 2.1	17.59 .60	27.6 1.7	20.23 .31	37.1 2.0	13.62 .31	61.7 2.0
29.7	15.55 .29	67.4 2.2	18.18 .56	29.5 2.2	20.54 .30	39.1 2.0	13.93 .30	63.7 2.0
July 9.7	15.84 .27	69.7 2.3	18.72 .51	32.9 2.6	20.82 .28	41.2 2.0	14.22 .28	65.7 2.0
19.7	16.09 .24	71.9 2.2	19.20 .45	34.6 2.9	21.09 .25	43.2 1.9	14.49 .26	67.7 1.9
29.6	16.31 .20	74.1 2.2	19.62 .38	37.7 3.2	21.33 .22	45.1 1.8	14.74 .23	69.5 1.8
Aug. 8.6	16.50 .17	76.3 2.1	19.96 .30	41.1 3.4	21.53 .19	46.8 1.6	14.96 .20	71.2 1.6
18.6	16.64 .13	78.3 1.9	20.21 .21	44.6 3.6	21.70 .15	48.3 1.5	15.14 .16	72.7 1.4
28.5	16.75 .08	80.0 1.7	20.38 .12	48.2 3.6	21.83 .11	49.7 1.9	15.28 .12	74.1 1.2
Sept. 7.5	16.81 +.04	81.7 1.5	20.46 +.04	51.8 3.6	21.92 .07	50.8 1.0	15.38 .08	75.1 1.0
17.5	16.83 .00	83.0 1.3	20.45 -.03	55.4 3.5	21.97 +.03	51.7 0.8	15.44 .04	76.0 0.7
27.5	16.82 -.03	84.2 1.0	20.36 .13	58.9 3.4	21.98 -.01	52.3 0.5	15.46 +.01	76.6 0.5
Oct. 7.4	16.77 .06	85.1 0.8	20.19 .21	62.1 3.1	21.96 .04	52.8 0.3	15.45 -.03	77.0 0.3
17.4	16.69 .09	85.7 0.5	19.94 .28	65.1 2.8	21.90 .06	53.0 +0.1	15.41 .05	77.1 +0.1
27.4	16.59 .11	86.1 +0.3	19.62 .35	67.8 2.4	21.83 .08	53.0 -0.1	15.35 .07	77.1 -0.1
Nov. 6.4	16.48 .12	86.3 0.0	19.25 .40	70.0 2.0	21.73 .10	52.8 0.3	15.26 .09	76.9 0.3
16.3	16.36 .13	86.2 -0.2	18.83 .44	71.8 1.5	21.63 .11	52.5 0.4	15.16 .10	76.5 0.4
26.3	16.23 .13	85.8 0.5	18.37 .47	73.0 1.0	21.51 .12	52.0 0.6	15.05 .11	76.0 0.6
Dec. 6.3	16.10 .13	85.3 0.7	17.89 .49	73.7 +0.4	21.39 .12	51.4 0.7	14.94 .12	75.4 0.7
16.2	15.97 .12	84.5 0.9	17.39 .49	73.8 -0.2	21.28 .12	50.7 0.8	14.82 .11	74.7 0.8
26.2	15.85 .11	83.5 1.0	16.90 .48	73.3 0.8	21.16 .11	49.9 0.8	14.71 .11	73.9 0.8
36.2	15.75 -.10	82.4 -1.2	16.43 -.45	72.2 -1.3	21.06 -.10	49.0 -0.9	14.61 -.10	73.0 -0.9

## APPARENT PLACES FOR THE UPPER TRANSIT AT WASHINGTON.

Mean Solar Date.	* $\gamma$ Cephei.		*Groombridge 4163.		$\omega$ Piscium.	
	Right Ascension.	Declination North.	Right Ascension.	Declination North.	Right Ascension.	Declination North.
	<sup>h</sup> 23 <sup>m</sup> 33	<sup>°</sup> 76 <sup>'</sup> 53	<sup>h</sup> 23 <sup>m</sup> 48	<sup>°</sup> 73 <sup>'</sup> 40	<sup>h</sup> 23 <sup>m</sup> 52	<sup>°</sup> 6 <sup>'</sup> 8
Jan. 1.2	59.23 -.89	79.8 -0.7	29.18 -.70	66.9 -0.6	34.22 -.12	13.0 -0.8
11.2	58.36 .83	78.8 1.3	28.49 .66	66.0 1.2	34.11 .11	12.2 0.9
21.1	57.56 .75	77.2 1.9	27.85 .61	64.5 1.7	34.01 .10	11.3 0.8
31.1	56.86 .64	75.1 2.3	27.27 .53	62.6 2.2	33.92 .08	10.5 0.8
Feb. 10.1	56.28 .51	72.5 2.7	26.78 .43	60.1 2.6	33.85 .06	9.7 0.7
20.1	55.84 .35	69.7 3.0	26.40 .32	57.4 2.9	33.80 .03	9.1 0.6
Mar. 2.0	55.57 -.18	66.6 3.1	26.15 .18	54.4 3.1	33.78 -.01	8.5 0.4
12.0	55.47 .00	63.4 3.2	26.04 -.04	51.3 3.1	33.79 +.03	8.2 -0.2
22.0	55.56 +.18	60.3 3.0	26.07 +.11	48.2 3.0	33.84 .07	8.1 0.0
Apr. 1.0	55.83 .35	57.3 2.8	26.25 .25	45.2 2.8	33.93 .11	8.2 +0.3
10.9	56.26 .51	54.6 2.5	26.57 .39	42.5 2.5	34.05 .15	8.6 0.5
20.9	56.86 .66	52.3 2.1	27.02 .51	40.2 2.1	34.22 .18	9.3 0.8
30.9	57.58 .78	50.5 1.6	27.59 .62	38.3 1.6	34.42 .22	10.3 1.1
May 10.8	58.42 .88	49.2 1.0	28.25 .70	36.9 1.1	34.65 .25	11.5 1.4
20.8	59.34 .95	48.4 -0.5	28.99 .77	36.1 -0.6	34.92 .28	13.0 1.6
30.8	60.21 .98	48.2 +0.1	29.79 .81	35.8 0.0	35.20 .29	14.7 1.8
June 9.8	61.30 .99	48.7 0.7	30.61 .82	36.1 +0.6	35.51 .31	16.5 1.9
19.7	62.29 .97	49.6 1.3	31.43 .81	37.0 1.1	35.82 .31	18.5 2.0
29.7	63.25 .92	51.2 1.8	32.24 .79	38.4 1.7	36.13 .30	20.5 2.0
July 9.7	64.14 .85	53.2 2.2	33.00 .74	40.3 2.1	36.42 .29	22.6 2.0
19.7	64.95 .76	55.7 2.7	33.71 .67	42.6 2.6	36.71 .27	24.6 1.9
29.6	65.66 .65	58.5 3.0	34.34 .59	45.4 2.9	36.97 .24	26.5 1.8
Aug. 8.6	66.26 .53	61.7 3.3	34.88 .49	48.5 3.2	37.20 .21	28.2 1.7
18.6	66.72 .40	65.1 3.5	35.32 .39	51.8 3.4	37.39 .18	29.8 1.5
28.5	67.05 .26	68.7 3.7	35.65 .28	55.3 3.6	37.55 .14	31.2 1.3
Sept. 7.5	67.24 +.12	72.5 3.7	35.87 .18	59.0 3.7	37.66 .10	32.4 1.0
17.5	67.29 -.03	76.2 3.7	35.98 +.05	62.7 3.7	37.75 .06	33.3 0.8
27.5	67.19 .17	79.9 3.6	35.97 -.07	66.4 3.6	37.79 +.03	34.0 0.6
Oct. 7.4	66.95 .30	83.5 3.5	35.84 .18	69.9 3.5	37.80 -.01	34.5 0.4
17.4	66.58 .43	86.8 3.2	35.61 .29	73.3 3.2	37.78 .04	34.7 +0.2
27.4	66.08 .55	89.9 2.9	35.27 .38	76.4 2.9	37.73 .06	34.8 0.0
Nov. 6.4	65.47 .66	92.6 2.5	34.84 .47	79.2 2.6	37.66 .08	34.7 -0.2
16.3	64.76 .75	94.9 2.0	34.32 .55	81.5 2.1	37.57 .09	34.4 0.4
26.3	63.97 .82	96.7 1.5	33.74 .62	83.4 1.6	37.47 .10	33.9 0.5
Dec. 6.3	63.12 .88	97.9 0.9	33.09 .67	84.7 1.0	37.36 .11	33.4 0.6
16.2	62.22 .90	98.5 +0.3	32.40 .69	85.5 -0.4	37.25 .12	32.7 0.7
26.2	61.31 .90	98.5 -0.3	31.70 .70	85.6 +0.2	37.13 .11	31.9 0.8
36.2	60.42 -.88	97.9 -0.9	31.00 -.69	85.1 +0.8	37.02 -.11	31.1 -0.8

# 326 SOLAR EPHEMERIS, 1869.

## AT WASHINGTON MEAN AND APPARENT NOON.

Date.	APPARENT RIGHT ASCENSION.			APPARENT DECLINATION.			Hourly motion, Mean Noon.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	Ap- parent Noon.		Mean Noon.	Ap- parent Noon.		Right Ascension.	Declination.				
Jan. 0	<sup>h</sup> 18 45 <sup>m</sup> 11.96 <sup>s</sup> 12.62	<sup>s</sup> 23 2 50.8	50.1	11.040	11.92	3 36.04	16 18.42	<sup>m</sup> 11.10	<sup>h</sup> 18 41 <sup>m</sup> 35.97			
1	18 49 36.78	37.53	22 57 50.8	50.0	11.027	4 4.33	18.42	11.06	18 45 32.52			
2	18 54 1.27	2.10	22 52 23.4	22.4	11.013	4 32.25	18.40	11.01	18 49 29.09			
3	18 58 25.41	26.32	22 46 28.7	27.5	10.998	4 59.83	18.39	10.96	18 53 25.64			
4	19 2 49.15	50.15	22 40 6.8	5.4	10.981	5 27.03	18.36	10.90	18 57 22.20			
5	19 7 12.49	13.57	22 33 18.0	16.3	10.964	5 53.82	18.33	10.84	19 1 18.76			
6	19 11 35.39	36.55	22 26 2.4	0.5	10.945	6 20.18	18.30	10.77	19 5 15.31			
7	19 15 57.83	59.07	22 18 20.3	18.1	10.925	6 46.07	18.27	10.70	19 9 11.87			
8	19 20 19.77	21.08	22 10 11.9	9.4	10.903	7 11.46	18.23	10.63	19 13 8.43			
9	19 24 41.20	42.58	22 1 37.4	34.6	10.881	7 36.33	18.18	10.56	19 17 4.98			
10	19 29 2.07	3.52	21 52 37.2	34.1	10.859	8 0.65	18.13	10.48	19 21 1.54			
11	19 33 22.36	23.88	21 43 11.4	8.0	10.833	8 24.38	18.08	10.40	19 24 58.10			
12	19 37 42.04	43.62	21 33 20.3	16.6	10.807	8 47.51	18.02	10.31	19 28 54.65			
13	19 42 1.10	2.74	21 23 4.2	0.2	10.780	9 10.01	17.95	10.23	19 32 51.21			
14	19 46 19.50	21.20	21 12 23.4	19.1	10.753	9 31.86	17.88	10.14	19 36 47.77			
15	19 50 37.23	38.99	21 1 18.2	13.6	10.724	9 53.03	17.81	10.05	19 40 44.32			
16	19 54 54.26	56.08	20 49 48.9	43.9	10.695	10 13.50	17.74	9.95	19 44 40.88			
17	19 59 10.57	12.44	20 37 55.9	50.6	10.664	10 33.26	17.66	9.85	19 48 37.44			
18	20 3 26.14	28.06	20 25 39.6	33.9	10.633	10 52.28	17.58	9.75	19 52 33.99			
19	20 7 40.95	42.92	20 12 60.2	54.2	10.601	11 10.54	17.50	9.65	19 56 30.55			
20	20 11 54.99	57.01	19 59 58.0	51.7	10.569	11 28.02	17.41	9.55	20 0 27.11			
21	20 16 8.25	10.31	19 46 33.4	26.8	10.536	11 44.72	17.32	9.45	20 4 23.66			
22	20 20 20.72	22.82	19 32 46.9	39.9	10.502	12 0.63	17.22	9.34	20 8 20.22			
23	20 24 32.39	34.53	19 18 38.8	31.4	10.469	12 15.74	17.12	9.23	20 12 16.77			
24	20 28 43.25	45.43	19 4 9.3	1.6	10.435	12 30.05	17.00	9.12	20 16 13.33			
25	20 32 53.30	55.51	18 49 19.0	11.0	10.401	12 43.54	16.88	9.01	20 20 9.88			
26	20 37 2.53	4.77	18 33 68.1	59.8	10.367	12 56.22	16.76	8.90	20 24 6.44			
27	20 41 10.95	13.21	18 18 37.1	28.5	10.333	13 8.09	16.63	8.79	20 28 2.99			
28	20 45 18.56	20.84	18 2 46.4	37.5	10.299	13 19.14	16.50	8.67	20 31 59.55			
29	20 49 25.35	27.65	17 46 36.2	27.0	10.265	13 29.36	16.36	8.56	20 35 56.10			
30	20 53 31.32	33.64	17 29 67.1	57.6	10.231	13 38.76	16.22	8.44	20 39 52.66			
31	20 57 36.48	38.82	17 13 19.3	9.5	10.198	13 47.35	16.07	8.33	20 43 49.21			
Feb. 1	21 1 40.84	43.20	16 56 13.4	3.4	10.165	13 55.15	15.92	8.21	20 47 45.77			
2	21 5 44.41	46.78	16 38 49.6	39.4	10.131	14 2.16	15.76	8.10	20 51 42.32			
3	21 9 47.17	49.55	16 20 68.4	57.9	10.098	14 8.35	15.59	7.98	20 55 38.88			
4	21 13 49.12	51.51	16 2 70.1	59.4	10.065	14 13.74	15.42	7.87	20 59 35.43			
5	21 17 50.27	52.67	15 44 55.3	44.4	10.032	14 18.34	15.25	7.75	21 3 39.00			
6	21 21 50.64	53.04	15 26 24.3	13.1	9.999	14 22.15	15.08	7.64	21 7 28.54			
7	21 25 50.23	52.62	15 7 37.5	26.1	9.966	14 25.17	14.90	7.52	21 11 25.10			
8	21 29 49.03	51.42	14 48 35.4	23.9	9.933	14 27.41	14.72	7.41	21 15 21.65			
9	21 33 47.05	49.44	14 29 18.3	6.6	9.901	14 28.86	14.53	7.29	21 19 18.21			
10	21 37 44.29	46.68	14 9 46.7	34.8	9.869	14 29.54	14.34	7.18	21 23 14.76			
11	21 41 40.77	43.15	13 49 61.1	49.0	9.837	14 29.45	14.15	7.07	21 27 11.31			
12	21 45 36.48	38.85	13 29 61.8	49.7	9.805	14 28.59	13.96	6.96	21 31 7.87			
13	21 49 31.43	33.79	13 9 49.2	37.0	9.773	14 26.98	13.76	6.85	21 35 4.42			
14	21 53 25.63	27.98	12 49 23.9	11.6	9.743	14 24.62	13.57	6.74	21 39 0.98			
15	21 57 19.09	21.42	12 28 46.2	33.8	9.713	14 21.52	13.37	6.64	21 42 57.53			
16	22 1 11.81	14.12	12 7 56.5	44.1	9.682	14 17.68	13.17	6.54	21 46 54.08			
17	22 5 3.80	6.09	11 46 55.5	43.0	9.652	14 13.11	12.96	6.44	21 50 50.64			
18	22 8 55.07	57.34	11 25 43.3	30.8	9.622	14 7.83	12.76	6.34	21 54 47.19			
19	22 12 45.64	47.89	11 4 20.5	7.9	9.593	14 1.84	12.55	6.25	21 58 43.74			
20	22 16 35.53	37.75	10 42 47.4	34.9	9.565	13 55.17	12.33	6.15	22 2 40.30			
21	22 20 24.76	26.95	10 20 64.5	52.0	9.537	13 47.83	12.11	6.06	22 6 36.85			
22	22 24 13.34	15.50	9 58 72.1	59.7	9.510	13 39.85	11.89	5.97	22 10 33.40			
23	22 28 1.28	3.41	9 36 70.8	58.4	9.485	13 31.23	11.66	5.88	22 14 29.95			
24	22 31 48.60	50.70	9 14 60.9	48.5	9.460	13 21.99	11.43	5.79	22 18 26.51			
25	22 35 35.33	37.40	8 52 42.6	30.2	9.435	13 12.16	11.20	5.70	22 22 23.06			
26	22 39 21.48	23.52	8 30 16.5	4.2	9.412	13 1.76	10.96	5.62	22 26 19.61			
27	22 43 7.09	9.10	8 7 42.9	30.8	9.389	12 50.81	10.72	5.54	22 30 16.16			
28	22 46 52.17	54.14	7 44 62.2	50.2	9.368	12 39.34	10.48	5.46	22 34 12.72			
29	22 50 36.74	38.68	7 22 14.8	2.9	9.347	12 27.36	10.23	5.39	22 38 9.27			

NOTE.—For Mean Interval of Semidiameter passing the Meridian, subtract 0.19 from the Sidereal Interval.



## AT WASHINGTON MEAN AND APPARENT NOON.

Date.	APPARENT RIGHT ASCENSION.			APPARENT DECLINATION.			Hourly motion, Mean Noon.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	Ap- parent Noon.		Mean Noon.	Ap- parent Noon.		Right Ascension.	Declination.				
Mar. 1	<sup>h</sup> 22 <sup>m</sup> 50 <sup>s</sup> 36.74	38.68	—	<sup>°</sup> 22 <sup>'</sup> 14.8	2.9	9.347	57.11	+12 27.36	16 10.23	<sup>m</sup> 5.39	<sup>h</sup> 22 <sup>m</sup> 38 <sup>s</sup> 9.27	
2	22 54 20.82	22.72		6 59 21.1	9.4	9.327	57.36	12 14.89	9.98	5.32	22 42 5.82	
3	22 58 4.44	6.30		6 36 21.4	9.8	9.308	57.60	12 1.96	9.73	5.25	22 46 2.38	
4	23 1 47.61	49.43		6 13 16.1	4.7	9.290	57.82	11 48.57	9.47	5.19	22 49 58.93	
5	23 5 30.36	32.15		5 49 65.7	54.5	9.273	58.03	11 34.77	9.21	5.12	22 53 55.47	
6	23 9 12.71	14.46		5 26 50.4	39.4	9.257	58.23	11 20.57	8.95	5.06	22 57 52.03	
7	23 12 54.67	56.38		5 3 30.6	19.8	9.241	58.40	11 5.98	8.69	5.00	23 1 48.59	
8	23 16 36.26	37.93		4 39 66.8	56.2	9.226	58.56	10 51.01	8.43	4.94	23 5 45.14	
9	23 20 17.50	19.13		4 16 39.4	29.0	9.211	58.71	10 35.70	8.16	4.89	23 9 41.69	
10	23 23 58.41	59.99		3 52 68.6	58.4	9.197	58.84	10 20.05	7.90	4.84	23 13 38.24	
11	23 27 38.99	40.53		3 29 35.0	25.0	9.184	58.95	10 4.09	7.63	4.80	23 17 34.80	
12	23 31 19.28	20.77		3 5 58.9	49.1	9.172	59.05	9 47.82	7.36	4.75	23 21 31.35	
13	23 34 59.28	60.73		2 42 20.7	11.2	9.161	59.13	9 31.27	7.09	4.71	23 25 27.90	
14	23 38 39.03	40.43		2 18 40.8	31.6	9.151	59.19	9 14.46	6.82	4.67	23 29 24.45	
15	23 42 18.51	19.88		1 54 59.6	50.7	9.141	59.23	8 57.40	6.56	4.63	23 33 21.00	
16	23 45 57.77	59.09		1 31 17.4	8.8	9.131	59.26	8 40.10	6.29	4.60	23 37 17.55	
17	23 49 36.80	38.08		1 7 34.7	26.4	9.122	59.28	8 22.58	6.02	4.58	23 41 14.11	
18	23 53 15.64	16.88		0 43 51.8	43.8	9.114	59.28	8 4.88	5.75	4.56	23 45 10.66	
19	23 56 54.30	55.49	—	0 20 9.2	1.5	9.108	59.26	7 47.00	5.49	4.54	23 49 7.21	
20	0 0 32.80	33.94	+	0 3 32.8	40.2	9.102	59.23	7 28.95	5.22	4.52	23 53 3.76	
21	0 4 11.16	12.25		0 27 14.0	21.1	9.096	59.19	7 10.76	4.95	4.50	23 57 0.31	
22	0 7 49.40	50.44		0 50 53.8	60.6	9.091	59.12	6 52.46	4.68	4.49	0 0 56.86	
23	0 11 27.55	28.55		1 14 31.9	38.4	9.087	59.04	6 34.06	4.41	4.48	0 4 53.42	
24	0 15 5.62	6.58		1 38 8.0	14.2	9.085	58.95	6 15.58	4.14	4.47	0 8 49.97	
25	0 18 43.64	44.55		2 1 41.7	47.5	9.083	58.85	5 57.05	3.87	4.46	0 12 46.52	
26	0 22 21.64	22.50		2 26 12.7	18.2	9.083	58.73	5 38.49	3.60	4.46	0 16 43.08	
27	0 25 59.63	60.44		2 48 40.7	45.9	9.083	58.60	5 19.93	3.32	4.46	0 20 39.63	
28	0 29 37.63	38.39		3 12 5.3	10.2	9.084	58.45	5 1.38	3.04	4.46	0 24 36.18	
29	0 33 15.69	16.40		3 35 26.2	30.8	9.086	58.29	4 42.89	2.76	4.47	0 28 32.73	
30	0 36 53.81	54.48		3 58 43.1	47.4	9.089	58.12	4 24.47	2.48	4.48	0 32 29.28	
31	0 40 32.03	32.65		4 21 55.6	59.5	9.094	57.93	4 6.14	2.20	4.49	0 36 25.84	
Apr. 1	0 44 10.36	10.93		4 45 3.4	7.0	9.099	57.72	3 47.92	1.92	4.51	0 40 22.39	
2	0 47 48.82	49.35		5 8 6.1	9.4	9.106	57.50	3 29.83	1.63	4.53	0 44 18.94	
3	0 51 27.43	27.91		5 31 3.5	6.5	9.113	57.27	3 11.89	1.34	4.55	0 48 15.50	
4	0 55 6.22	6.66		5 53 55.2	57.9	9.120	57.03	2 54.13	1.06	4.57	0 52 12.04	
5	0 58 45.21	45.60		6 16 40.9	43.3	9.128	56.77	2 36.57	0.78	4.60	0 56 8.60	
6	1 2 24.40	24.75		6 39 20.2	22.3	9.137	56.50	2 19.21	0.50	4.64	1 0 5.15	
7	1 6 3.81	4.12		7 1 52.8	54.7	9.147	56.22	2 2.07	0.22	4.67	1 4 1.70	
8	1 9 43.47	43.73		7 24 18.3	20.0	9.157	55.91	1 45.19	15 59.95	4.70	1 7 58.25	
9	1 13 23.39	23.61		7 46 36.5	37.9	9.168	55.60	1 28.57	59.67	4.74	1 11 54.81	
10	1 17 3.57	3.75		8 8 46.8	47.9	9.180	55.27	1 12.21	59.40	4.78	1 15 51.36	
11	1 20 44.04	44.18		8 30 49.0	49.8	9.192	54.92	0 56.13	59.13	4.82	1 19 47.91	
12	1 24 24.80	24.90		8 52 42.7	43.3	9.205	54.55	0 40.33	58.86	4.86	1 23 44.46	
13	1 28 5.88	5.94		9 14 27.6	28.0	9.218	54.17	0 24.85	58.59	4.91	1 27 41.02	
14	1 31 47.28	47.30		9 36 3.2	3.4	9.232	53.78	+0 9.70	58.32	4.96	1 31 37.57	
15	1 35 29.02	29.00		9 57 29.3	29.3	9.246	53.37	—0 5.11	58.06	5.01	1 35 34.12	
16	1 39 11.10	11.04		10 18 45.5	45.3	9.261	52.95	0 19.58	57.80	5.07	1 39 30.68	
17	1 42 53.54	53.44		10 39 51.4	51.0	9.276	52.52	0 33.69	57.54	5.12	1 43 27.23	
18	1 46 36.34	36.21		11 0 46.7	46.1	9.291	52.07	0 47.44	57.28	5.18	1 47 23.78	
19	1 50 19.53	19.36		11 21 31.0	30.2	9.308	51.61	1 0.81	57.03	5.24	1 51 20.34	
20	1 54 3.12	2.92		11 42 4.1	3.1	9.325	51.14	1 13.77	56.78	5.30	1 55 16.89	
21	1 57 47.13	46.90		12 2 25.6	24.4	9.343	50.64	1 26.31	56.53	5.37	1 59 13.44	
22	2 1 31.57	31.31		12 22 35.2	33.9	9.361	50.14	1 38.42	56.28	5.44	2 3 10.00	
23	2 5 16.45	16.16		12 42 32.6	31.1	9.380	49.62	1 50.08	56.03	5.51	2 7 6.55	
24	2 9 1.79	1.47		13 2 17.3	15.7	9.399	49.08	2 1.29	55.78	5.58	2 11 3.10	
25	2 12 47.61	47.26		13 21 49.2	47.4	9.419	48.54	2 12.03	55.53	5.65	2 14 59.66	
26	2 16 33.91	33.53		13 41 7.8	5.9	9.439	47.99	2 22.28	55.29	5.72	2 18 56.21	
27	2 20 20.71	20.31		14 0 12.9	10.9	9.460	47.43	2 32.03	55.04	5.79	2 22 52.76	
28	2 24 8.02	7.60		14 19 4.3	2.2	9.482	46.85	2 41.27	54.80	5.87	2 26 49.32	
29	2 27 55.86	55.42		14 37 41.5	39.3	9.504	46.25	2 49.99	54.55	5.94	2 30 45.87	
30	2 31 44.24	43.77		14 56 4.5	2.2	9.527	45.65	2 58.17	54.31	6.02	2 34 42.43	
31	2 35 33.17	32.68	+15 14 12.8	10.5	9.550	45.03	—3 5.79	15 54.07	1 6.10	6.10	2 38 38.98	

NOTE.—For Mean Interval of Semidiameter passing the Meridian, subtract 0s 18 from the Sidereal Interval.

# 328 SOLAR EPHEMERIS, 1869.

## AT WASHINGTON MEAN AND APPARENT NOON.

Date.	APPARENT RIGHT ASCENSION.			APPARENT DECLINATION.			Hourly motion, Mean Noon.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	Ap- parent Noon.		Mean Noon.	Ap- parent Noon.		Right Ascension.	Declination.				
May	1	2 35 33.17	32.68	+15 14 12.8	10.5	9.550	45.03	3 5.79	15 54.07	6.10	2 38 38.98	
	2	2 39 22.66	22.15	15 32 6.0	3.6	9.574	44.40	3 12.85	53.83	6.18	2 42 35.54	
	3	2 43 12.72	12.19	15 49 43.9	41.4	9.597	43.75	3 19.34	53.59	6.26	2 46 32.09	
	4	2 47 3.35	2.80	16 7 6.2	3.7	9.621	43.10	3 25.27	53.36	6.34	2 50 28.64	
	5	2 50 54.56	54.00	16 24 12.6	10.1	9.645	42.42	3 30.63	53.13	6.42	2 54 25.20	
	6	2 54 46.35	45.98	16 41 2.7	0.2	9.670	41.74	3 35.40	52.90	6.51	2 58 21.75	
	7	2 58 38.72	38.13	16 57 36.3	33.8	9.694	41.04	3 39.59	52.67	6.59	3 2 18.31	
	8	3 2 31.67	31.07	17 13 53.1	50.6	9.718	40.34	3 43.20	52.45	6.67	3 6 14.86	
	9	3 6 25.20	24.59	17 29 52.7	50.2	9.742	39.61	3 46.22	52.24	6.75	3 10 11.42	
	10	3 10 19.31	18.69	17 45 34.9	32.4	9.766	38.88	3 48.66	52.03	6.83	3 14 7.97	
	11	3 14 14.00	13.37	18 0 59.2	56.7	9.790	38.14	3 50.53	51.81	6.91	3 18 4.53	
	12	3 18 9.26	8.63	18 16 5.5	3.1	9.814	37.38	3 51.83	51.60	7.01	3 22 1.08	
	13	3 22 5.09	4.46	18 30 53.4	51.0	9.838	36.60	3 52.56	51.40	7.08	3 25 57.64	
	14	3 26 1.49	0.85	18 45 22.5	20.2	9.862	35.82	3 52.72	51.20	7.16	3 29 54.19	
	15	3 29 58.45	57.81	18 59 32.7	30.4	9.885	35.02	3 52.31	51.01	7.24	3 33 50.75	
	16	3 33 55.96	55.32	19 13 23.5	21.3	9.908	34.21	3 51.35	50.82	7.32	3 37 47.31	
	17	3 37 54.02	53.38	19 26 54.8	52.6	9.931	33.39	3 49.85	50.63	7.40	3 41 43.86	
	18	3 41 52.61	51.98	19 40 6.3	4.2	9.953	32.56	3 47.81	50.45	7.48	3 45 40.42	
	19	3 45 51.74	51.11	19 52 57.8	55.8	9.975	31.72	3 45.24	50.27	7.56	3 49 36.97	
	20	3 49 51.39	50.77	20 5 28.8	26.9	9.997	30.86	3 42.14	50.10	7.63	3 53 33.53	
	21	3 53 51.57	50.96	20 17 39.3	37.5	10.019	29.99	3 38.51	49.93	7.71	3 57 30.09	
	22	3 57 52.27	51.67	20 29 28.8	27.1	10.040	29.12	3 34.37	49.76	7.79	4 1 26.64	
	23	4 1 53.48	52.89	20 40 57.3	55.6	10.061	28.24	3 29.72	49.61	7.87	4 5 23.20	
	24	4 5 55.20	54.62	20 52 4.4	2.8	10.082	27.35	3 24.57	49.45	7.94	4 9 19.75	
	25	4 9 57.42	56.86	21 2 50.1	48.6	10.103	26.45	3 18.91	49.29	8.01	4 13 16.31	
	26	4 14 0.13	59.59	21 13 14.0	12.6	10.123	25.54	3 12.76	49.13	8.08	4 17 12.87	
	27	4 18 3.32	2.80	21 23 16.0	14.7	10.143	24.62	3 6.13	48.97	8.14	4 21 9.42	
	28	4 22 6.99	6.48	21 32 55.8	54.6	10.163	23.70	2 59.02	48.82	8.20	4 25 5.98	
	29	4 26 11.12	10.63	21 42 13.4	12.3	10.181	22.76	2 51.45	48.67	8.26	4 29 2.54	
	30	4 30 15.71	15.24	21 51 8.3	7.3	10.200	21.82	2 43.42	48.52	8.32	4 32 59.09	
	June	31	4 34 20.74	20.30	21 59 40.5	39.6	10.218	20.86	2 34.94	48.38	8.38	4 36 55.65
1		4 38 26.20	25.79	22 7 49.9	49.1	10.236	19.91	2 26.03	48.24	8.44	4 40 52.21	
2		4 42 32.07	31.68	22 15 36.2	35.5	10.252	18.94	2 16.71	48.10	8.49	4 44 48.76	
3		4 46 38.34	37.97	22 22 59.3	58.7	10.268	17.97	2 7.00	47.97	8.54	4 48 45.32	
4		4 50 44.99	44.65	22 29 59.0	58.5	10.284	17.00	1 56.90	47.84	8.59	4 52 41.88	
5		4 54 52.00	51.69	22 36 35.2	34.7	10.299	16.02	1 46.45	47.72	8.64	4 56 38.43	
6		4 58 59.35	59.08	22 42 47.7	47.3	10.312	15.03	1 35.66	47.60	8.68	5 0 34.99	
7		5 3 7.01	6.77	22 48 36.4	36.1	10.325	14.03	1 24.56	47.49	8.72	5 4 31.55	
8		5 7 14.96	14.75	22 54 1.1	0.8	10.336	13.03	1 13.16	47.38	8.76	5 8 28.10	
9		5 11 23.18	23.01	22 59 1.6	1.3	10.347	12.02	1 1.50	47.27	8.80	5 12 24.66	
10		5 15 31.64	31.50	23 3 37.9	37.7	10.357	11.01	0 49.60	47.17	8.83	5 16 21.22	
11		5 19 40.32	40.21	23 7 49.9	49.8	10.366	10.00	0 37.48	47.08	8.86	5 20 17.78	
12		5 23 49.19	49.12	23 11 37.5	37.5	10.373	8.98	0 25.17	46.99	8.88	5 24 14.33	
13		5 27 58.22	58.19	23 15 0.6	0.6	10.379	7.95	0 12.68	46.91	8.90	5 28 10.89	
14		5 32 7.40	7.40	23 17 59.1	59.1	10.384	6.92	0 0.05	46.83	8.92	5 32 7.45	
15		5 36 16.68	16.72	23 20 32.9	33.0	10.389	5.89	+ 0 12.69	46.76	8.94	5 36 4.01	
16		5 40 26.05	26.13	23 22 41.9	42.0	10.392	4.86	0 25.50	46.70	8.96	5 40 0.57	
17		5 44 35.48	35.60	23 24 26.2	26.3	10.394	3.83	0 38.37	46.64	8.97	5 43 57.12	
18		5 48 44.96	45.11	23 25 45.8	45.9	10.395	2.80	0 51.29	46.58	8.98	5 47 53.68	
19		5 52 54.45	54.64	23 26 40.5	40.6	10.395	1.77	1 4.23	46.53	8.98	5 51 50.24	
20		5 57 3.95	4.17	23 27 10.4	10.4	10.395	+0.74	1 17.17	46.48	8.98	5 55 46.79	
21	6 1 13.42	13.68	23 27 15.5	15.5	10.394	-0.30	1 30.08	46.43	8.98	5 59 43.35		
22	6 5 22.85	23.15	23 26 55.8	55.8	10.391	1.33	1 42.96	46.38	8.98	6 3 39.91		
23	6 9 32.21	32.55	23 26 11.3	11.3	10.388	2.37	1 55.77	46.34	8.97	6 7 36.46		
24	6 13 41.49	41.86	23 25 2.1	2.0	10.384	3.40	2 8.49	46.30	8.96	6 11 33.02		
25	6 17 50.66	51.07	23 23 28.1	27.9	10.380	4.43	2 21.10	46.27	8.94	6 15 29.58		
26	6 21 59.71	60.16	23 21 29.4	29.1	10.374	5.45	2 33.60	46.24	8.92	6 19 26.13		
27	6 26 8.62	9.11	23 19 6.1	5.8	10.367	6.47	2 45.95	46.21	8.89	6 23 22.69		
28	6 30 17.37	17.89	23 16 18.2	17.9	10.360	7.49	2 58.14	46.19	8.86	6 27 19.25		
29	6 34 25.94	26.49	23 13 5.9	5.5	10.352	8.51	3 10.16	46.17	8.83	6 31 15.81		
30	6 38 34.31	34.89	23 9 29.2	28.7	10.343	9.53	3 21.98	46.15	8.80	6 35 12.36		
31	6 42 42.46	43.07	+23 5 28.2	27.6	10.334	10.54	+ 3 33.57	46.14	8.77	6 39 8.92		

NOTE.—For Mean Interval of Semidiameter passing the Meridian, subtract 0s 18 from the Sidereal Interval.

# SOLAR EPHEMERIS, 1869. 329

## AT WASHINGTON MEAN AND APPARENT NOON.

Date.	APPARENT RIGHT ASCENSION.		APPARENT DECLINATION.		Hourly motion, Mean Noon.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	Apparent Noon.	Mean Noon.	Apparent Noon.	Right Ascension.	Declination.				
July 1	h m s	° ' "	h m s	° ' "	h m s	° ' "	+ m s	° ' "	h m s	h m s
2	6 42 42.46	43.07	+23 5 28.2	27.6	10.334	10.54	3 33.57	15 46.14	8.77	6 39 8.92
3	6 46 50.37	51.01	23 1 3.0	2.3	10.324	11.55	3 44.92	46.13	8.73	6 43 5.48
4	6 50 58.02	58.70	22 56 13.7	12.9	10.312	12.55	3 56.01	46.12	8.69	6 47 2.04
5	6 55 5.38	6.09	22 50 60.5	59.6	10.300	13.55	4 6.82	46.12	8.65	6 50 58.59
6	6 59 12.42	13.16	22 45 23.3	22.2	10.287	14.54	4 17.30	46.13	8.60	6 54 55.15
7	7 3 19.14	19.91	22 39 22.4	21.2	10.273	15.53	4 27.46	46.14	8.55	6 58 51.71
8	7 7 25.51	26.31	22 32 58.0	56.7	10.258	16.51	4 37.28	46.16	8.50	7 2 48.26
9	7 11 31.51	32.33	22 26 10.1	8.8	10.241	17.48	4 46.72	46.19	8.45	7 6 44.82
10	7 15 37.11	37.95	22 18 59.1	57.6	10.224	18.45	4 55.76	46.22	8.39	7 10 41.38
11	7 19 42.29	43.15	22 11 24.9	23.2	10.206	19.40	5 4.38	46.25	8.33	7 14 37.93
12	7 23 47.03	47.91	22 3 27.8	26.0	10.188	20.35	5 12.56	46.29	8.27	7 18 34.49
13	7 27 51.32	52.21	21 55 8.0	6.1	10.169	21.29	5 20.29	46.34	8.20	7 22 31.04
14	7 31 55.12	56.04	21 46 25.6	23.7	10.149	22.23	5 27.54	46.39	8.13	7 26 27.60
15	7 35 58.43	59.38	21 37 20.9	18.9	10.128	23.16	5 34.29	46.44	8.06	7 30 24.16
16	7 40 1.24	2.21	21 27 54.1	51.9	10.106	24.07	5 40.53	46.50	7.99	7 34 20.72
17	7 44 3.52	4.50	21 18 5.4	3.0	10.084	24.98	5 46.26	46.57	7.92	7 38 17.28
18	7 48 5.26	6.24	21 7 55.0	52.4	10.062	25.88	5 51.46	46.64	7.85	7 42 13.83
19	7 52 6.45	7.44	20 57 23.1	20.4	10.039	26.77	5 56.09	46.71	7.78	7 46 10.39
20	7 56 7.08	8.08	20 46 30.1	27.3	10.015	27.65	6 0.15	46.79	7.70	7 50 6.94
21	8 0 7.15	8.15	20 35 16.0	13.2	9.992	28.52	6 3.66	46.87	7.62	7 54 3.50
22	8 4 6.66	7.66	20 23 41.2	38.3	9.968	29.38	6 6.60	46.96	7.54	7 58 0.06
23	8 8 5.59	6.59	20 11 45.8	42.8	9.944	30.23	6 8.97	47.05	7.46	8 1 56.61
24	8 12 3.94	4.94	19 59 30.3	27.1	9.920	31.07	6 10.76	47.14	7.38	8 5 53.17
25	8 16 1.71	2.71	19 46 54.6	51.3	9.896	31.90	6 11.98	47.23	7.30	8 9 49.72
26	8 19 58.90	59.90	19 33 59.3	55.8	9.871	32.71	6 12.61	47.33	7.21	8 13 46.28
27	8 23 55.50	56.50	19 20 44.4	40.9	9.847	33.51	6 12.66	47.43	7.13	8 17 42.84
28	8 27 51.52	52.52	19 7 10.4	6.8	9.822	34.31	6 12.12	47.54	7.04	8 21 39.39
29	8 31 46.95	47.95	18 53 17.3	13.7	9.798	35.10	6 10.99	47.64	6.96	8 25 35.95
30	8 35 41.80	42.79	18 39 5.6	1.9	9.774	35.87	6 9.28	47.75	6.87	8 29 32.50
31	8 39 36.06	37.05	18 24 35.3	31.6	9.750	36.64	6 6.98	47.87	6.78	8 33 29.06
Aug. 1	8 43 29.74	30.72	18 9 47.0	43.2	9.725	37.39	6 4.10	47.99	6.69	8 37 25.61
2	8 47 22.84	23.81	17 54 40.9	36.9	9.701	38.13	6 0.64	48.11	6.60	8 41 22.17
3	8 51 15.35	16.31	17 39 17.0	13.1	9.677	38.85	5 56.60	48.24	6.52	8 45 18.72
4	8 55 7.28	8.23	17 23 35.9	32.0	9.653	39.57	5 51.97	48.37	6.43	8 49 15.28
5	8 58 58.62	59.55	17 7 37.7	33.8	9.628	40.27	5 46.76	48.50	6.34	8 53 11.84
6	9 2 49.37	50.28	16 51 22.9	19.0	9.604	40.96	5 40.95	48.64	6.25	8 57 8.39
7	9 6 39.53	40.42	16 34 51.6	47.7	9.579	41.63	5 34.56	48.79	6.17	9 1 4.95
8	9 10 29.11	29.98	16 18 4.2	0.3	9.555	42.30	5 27.58	48.94	6.08	9 5 1.50
9	9 14 18.10	18.95	16 0 61.1	57.3	9.530	42.94	5 20.02	49.09	6.00	9 8 58.06
10	9 18 6.51	7.34	15 43 42.5	38.7	9.506	43.58	5 11.88	49.26	5.91	9 12 54.61
11	9 21 54.33	55.13	15 26 8.8	5.0	9.481	44.21	5 3.15	49.43	5.83	9 16 51.16
12	9 25 41.57	42.34	15 8 20.2	16.5	9.457	44.83	4 53.83	49.60	5.75	9 20 47.72
13	9 29 28.24	28.98	14 50 17.1	13.5	9.433	45.42	4 43.94	49.77	5.67	9 24 44.27
14	9 33 14.34	15.05	14 31 59.9	56.4	9.409	46.01	4 33.48	49.95	5.59	9 28 40.83
15	9 36 59.88	60.56	14 13 28.7	25.3	9.386	46.58	4 22.46	50.13	5.51	9 32 37.38
16	9 40 44.87	45.52	13 54 44.1	40.8	9.363	47.14	4 10.89	50.31	5.43	9 36 33.94
17	9 44 29.31	29.93	13 35 46.2	43.0	9.340	47.69	3 58.79	50.50	5.36	9 40 30.49
18	9 48 13.22	13.80	13 16 35.5	32.4	9.319	48.22	3 46.15	50.69	5.28	9 44 27.04
19	9 51 56.61	57.16	12 57 12.0	9.1	9.298	48.74	3 32.98	50.89	5.21	9 48 23.60
20	9 55 39.50	40.01	12 37 36.3	33.6	9.277	49.24	3 19.31	51.08	5.14	9 52 20.15
21	9 59 21.90	22.37	12 17 48.6	46.0	9.257	49.73	3 5.16	51.28	5.07	9 56 16.71
22	10 3 3.82	4.26	11 57 49.3	46.9	9.237	50.21	2 50.53	51.48	5.00	10 0 13.26
23	10 6 45.28	45.68	11 37 38.6	36.4	9.218	50.68	2 35.44	51.68	4.94	10 4 9.81
24	10 10 26.30	26.66	11 17 16.9	14.9	9.200	51.13	2 19.91	51.88	4.88	10 8 6.37
25	10 14 6.90	7.22	10 56 44.4	42.6	9.182	51.57	2 3.95	52.09	4.82	10 12 2.92
26	10 17 47.10	47.37	10 35 61.5	59.9	9.166	52.00	1 47.59	52.30	4.76	10 15 59.47
27	10 21 26.90	27.13	10 15 8.4	7.0	9.150	52.42	1 30.84	52.51	4.70	10 19 56.03
28	10 25 6.34	6.53	9 54 5.5	4.3	9.135	52.82	1 13.73	52.73	4.64	10 23 52.58
29	10 28 45.42	45.57	9 32 53.1	52.2	9.120	53.21	0 56.27	52.95	4.59	10 27 49.13
30	10 32 24.17	24.27	9 11 31.5	30.9	9.106	53.59	0 38.48	53.17	4.53	10 31 45.69
31	10 36 2.60	2.65	8 50 0.9	0.6	9.093	53.95	0 20.37	53.39	4.48	10 35 42.24
32	10 39 40.73	40.73	+8 28 21.8	21.7	9.081	54.30	+0 1.95	53.61	4.43	10 39 38.79

NOTE.—For Mean Interval of Semidiameter passing the Meridian, subtract 0.18 from the Sidereal Interval.

# 330 SOLAR EPHEMERIS, 1869.

## AT WASHINGTON MEAN AND APPARENT NOON.

Date.	APPARENT RIGHT ASCENSION.		APPARENT DECLINATION.		Hourly motion, Mean Noon.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	Apparent Noon.	Mean Noon.	Apparent Noon.	Right Ascension.	Declination.				
Sep. 1	10 43 18.56	18.52	+ 8 6 34.3	34.5	9.070	54.64	- 0 16.77	15 53.84	1 4.39	10 43 35.34
2	10 46 56.12	56.03	7 44 38.9	39.4	9.059	54.96	0 35.77	54.07	4.35	10 47 31.90
3	10 50 33.43	33.29	7 22 36.0	36.8	9.049	55.27	0 55.01	54.30	4.31	10 51 28.45
4	10 54 10.49	10.30	7 0 25.8	26.9	9.039	55.57	1 14.49	54.54	4.27	10 55 25.00
5	10 57 47.32	47.08	6 38 8.6	10.0	9.030	55.86	1 34.21	54.78	4.24	10 59 21.56
6	11 1 23.93	23.64	6 15 44.9	46.6	9.021	56.12	1 54.15	55.02	4.21	11 3 18.11
7	11 5 0.34	0.00	5 53 14.9	16.9	9.013	56.37	2 14.29	55.27	4.18	11 7 14.66
8	11 8 36.57	36.18	5 30 39.0	41.4	9.005	56.61	2 34.61	55.52	4.16	11 11 11.21
9	11 12 12.63	12.19	5 7 57.5	60.3	8.999	56.83	2 55.10	55.78	4.14	11 15 7.77
10	11 15 48.53	48.04	4 45 10.9	14.1	8.993	57.04	3 15.75	56.04	4.12	11 19 4.32
11	11 19 24.29	23.75	4 23 19.3	22.8	8.987	57.24	3 36.53	56.30	4.11	11 23 0.87
12	11 22 59.93	59.34	3 59 23.2	27.0	8.982	57.42	3 57.43	56.56	4.09	11 26 57.42
13	11 26 35.46	34.83	3 36 23.0	27.2	8.978	57.58	4 18.44	56.82	4.08	11 30 53.97
14	11 30 10.92	10.23	3 13 19.0	23.5	8.975	57.74	4 39.54	57.08	4.07	11 34 50.53
15	11 33 46.31	45.56	2 50 11.4	16.2	8.973	57.88	5 0.69	57.35	4.06	11 38 47.08
16	11 37 21.66	20.85	2 27 0.7	5.9	8.972	58.01	5 21.88	57.62	4.06	11 42 43.63
17	11 40 56.98	56.12	2 3 47.1	52.7	8.971	58.12	5 43.11	57.89	4.06	11 46 40.18
18	11 44 32.30	31.39	1 40 31.0	36.9	8.972	58.22	6 4.34	58.16	4.06	11 50 36.74
19	11 48 7.66	6.70	1 17 12.7	19.0	8.974	58.31	6 25.53	58.42	4.07	11 54 33.29
20	11 51 43.07	42.06	0 53 52.6	59.2	8.977	58.37	6 46.66	58.69	4.08	11 58 29.84
21	11 55 18.56	17.49	0 30 30.9	37.9	8.980	58.43	7 7.72	58.96	4.09	12 2 26.39
22	11 58 54.14	53.02	+ 0 7 8.0	15.3	8.985	58.48	7 28.69	59.23	4.10	12 6 22.95
23	12 2 29.84	28.67	- 0 16 15.8	8.2	8.991	58.50	7 49.54	59.50	4.12	12 10 19.50
24	12 6 5.69	4.47	0 39 40.2	32.3	8.998	58.52	8 10.23	59.77	4.14	12 14 16.05
25	12 9 41.71	40.43	1 2 64.9	56.7	9.005	58.53	8 30.76	16 0.04	4.17	12 18 12.60
26	12 13 17.92	16.59	1 26 29.5	20.9	9.014	58.52	8 51.10	0.31	4.20	12 22 9.15
27	12 16 54.35	52.97	1 49 53.7	44.7	9.023	58.49	9 11.23	0.58	4.23	12 26 5.71
28	12 20 31.02	29.59	2 13 17.1	7.8	9.033	58.46	9 31.12	0.85	4.26	12 30 2.26
29	12 24 7.94	6.46	2 36 39.5	29.8	9.044	58.41	9 50.74	1.12	4.30	12 33 58.81
30	12 27 45.14	43.61	2 59 60.5	50.4	9.056	58.34	10 10.09	1.39	4.34	12 37 55.36
Oct. 1	12 31 22.63	21.05	3 23 19.6	9.3	9.068	58.26	10 29.15	1.66	4.38	12 41 51.92
2	12 34 60.43	58.80	3 46 36.6	26.1	9.082	58.17	10 47.89	1.93	4.43	12 45 48.47
3	12 38 38.57	36.89	4 9 51.2	40.4	9.096	58.05	11 6.30	2.21	4.48	12 49 45.03
4	12 42 17.06	15.33	4 32 62.9	51.8	9.111	57.92	11 24.37	2.48	4.53	12 53 41.57
5	12 45 55.91	54.13	4 56 11.3	0.1	9.126	57.78	11 42.08	2.76	4.58	12 57 38.12
6	12 49 35.14	33.31	5 19 16.0	4.6	9.143	57.61	11 59.41	3.04	4.64	13 1 34.68
7	12 53 14.77	12.89	5 42 16.7	5.0	9.160	57.44	12 16.33	3.32	4.70	13 5 31.23
8	12 56 54.81	52.88	6 5 12.9	1.0	9.178	57.25	12 32.84	3.60	4.77	13 9 27.78
9	13 0 35.27	33.30	6 27 64.3	52.1	9.196	57.03	12 48.92	3.88	4.84	13 13 24.33
10	13 4 16.18	14.17	6 50 50.5	38.1	9.215	56.81	13 4.56	4.16	4.91	13 17 20.89
11	13 7 57.56	55.50	7 13 31.0	18.5	9.234	56.57	13 19.73	4.44	4.98	13 21 17.44
12	13 11 39.42	37.32	7 35 65.6	52.9	9.254	56.31	13 34.42	4.73	5.05	13 25 13.99
13	13 15 21.77	19.63	7 58 33.8	20.9	9.276	56.04	13 48.62	5.01	5.13	13 29 10.54
14	13 19 4.64	2.46	8 20 55.3	42.3	9.298	55.75	14 2.32	5.29	5.21	13 33 7.10
15	13 22 48.04	45.82	8 42 69.6	56.5	9.320	55.44	14 15.48	5.57	5.29	13 37 3.65
16	13 26 31.99	29.73	9 5 16.3	3.1	9.343	55.12	14 28.09	5.85	5.37	13 41 0.20
17	13 30 16.53	14.23	9 27 15.2	1.9	9.367	54.78	14 40.11	6.12	5.46	13 44 56.76
18	13 33 61.66	59.33	9 48 65.8	52.4	9.392	54.42	14 51.53	6.40	5.55	13 48 53.31
19	13 37 47.40	45.03	10 10 47.8	34.3	9.418	54.06	15 2.34	6.67	5.64	13 52 49.86
20	13 41 33.78	31.38	10 32 20.7	7.1	9.445	53.67	15 12.53	6.94	5.73	13 56 46.42
21	13 45 20.81	18.38	10 53 44.2	30.5	9.473	53.27	15 22.06	7.21	5.83	14 0 42.97
22	13 49 8.52	6.06	11 14 57.9	44.2	9.502	52.86	15 30.91	7.48	5.93	14 4 39.52
23	13 52 56.91	54.42	11 35 61.5	47.9	9.531	52.43	15 39.07	7.74	6.03	14 8 36.08
24	13 56 46.01	43.49	11 56 54.7	41.1	9.561	51.98	15 46.53	7.99	6.13	14 12 32.63
25	14 0 35.84	33.30	12 17 36.9	23.3	9.592	51.52	15 53.26	8.24	6.24	14 16 29.18
26	14 4 26.41	23.85	12 37 67.8	54.2	9.623	51.05	15 59.25	8.50	6.34	14 20 25.74
27	14 8 17.74	15.16	12 58 27.0	13.5	9.655	50.55	16 4.48	8.75	6.45	14 24 22.29
28	14 12 9.84	7.24	13 18 34.2	20.7	9.687	50.04	16 8.94	9.00	6.56	14 28 18.84
29	14 16 2.73	0.11	13 38 28.9	15.5	9.720	49.51	16 12.62	9.25	6.67	14 32 15.40
30	14 19 56.41	53.77	13 57 70.8	57.5	9.753	48.97	16 15.51	9.50	6.78	14 36 11.95
31	14 23 50.88	48.22	14 17 39.3	26.1	9.787	48.41	16 17.69	9.74	6.89	14 40 8.51
32	14 27 46.16	43.49	-14 36 54.2	41.1	9.820	47.83	-16 18.88	16 9.99	7.00	14 44 5.06

NOTE.—For Mean Interval of Semidiameter passing the Meridian, subtract 0s.18 from the Sidereal Interval.

## AT WASHINGTON MEAN AND APPARENT NOON.

Date.	APPARENT RIGHT ASCENSION.		APPARENT DECLINATION.		Hourly motion, Mean Noon.		Equation of Time for Apparent Noon.	Semi-diameter at Apparent Noon.	Sidereal Time of Semid. passing Merid.	Sidereal Time of Mean Noon.
	Mean Noon.	Ap- parent Noon.	Mean Noon.	Ap- parent Noon.	Right Ascension.	Declination.				
Nov. 1	14 27 46.16	43.49	14 36 54.2	41.1	9.820	47.83	-16 18.88	16 9.99	7.00	14 44 5.06
2	14 31 42.26	39.58	14 55 54.7	42.0	9.854	47.23	16 19.35	10.23	7.12	14 48 1.61
3	14 35 39.18	36.49	15 14 41.1	28.4	9.888	46.61	16 19.00	10.48	7.24	14 51 58.17
4	14 39 36.91	34.22	15 32 72.2	59.7	9.923	45.97	16 17.83	10.72	7.36	14 55 54.72
5	14 43 35.48	32.78	15 51 27.9	15.6	9.957	45.32	16 15.83	10.96	7.48	14 59 51.28
6	14 47 34.88	32.17	16 9 27.8	15.7	9.992	44.65	16 12.99	11.20	7.60	15 3 47.83
7	14 51 35.10	32.39	16 26 71.5	59.6	10.026	43.97	16 9.32	11.45	7.72	15 7 44.39
8	14 55 36.14	33.44	16 44 38.4	26.8	10.061	43.27	16 4.84	11.67	7.84	15 11 40.94
9	14 59 38.01	35.32	17 1 48.3	36.9	10.095	42.54	15 59.53	11.91	7.96	15 15 37.50
10	15 3 40.72	38.04	17 18 40.6	29.5	10.130	41.80	15 53.40	12.14	8.08	15 19 34.05
11	15 7 44.26	41.59	17 35 15.0	4.2	10.164	41.05	15 46.43	12.37	8.20	15 23 30.61
12	15 11 48.63	45.97	17 51 31.0	20.5	10.199	40.27	15 38.62	12.59	8.32	15 27 27.16
13	15 15 53.83	51.18	18 7 28.3	18.1	10.233	39.48	15 29.97	12.81	8.44	15 31 23.72
14	15 19 59.86	57.23	18 22 66.4	56.5	10.268	38.67	15 20.50	13.03	8.56	15 35 20.27
15	15 24 6.72	4.11	18 38 25.0	15.4	10.302	37.85	15 10.21	13.24	8.68	15 39 16.83
16	15 28 14.40	11.82	18 53 23.8	14.5	10.336	37.02	14 59.10	13.45	8.79	15 43 13.38
17	15 32 22.91	20.35	19 7 62.3	53.4	10.370	36.17	14 47.16	13.66	8.90	15 47 9.94
18	15 36 32.24	29.71	19 22 20.2	11.6	10.405	35.30	14 34.39	13.86	9.01	15 51 6.50
19	15 40 42.40	39.90	19 36 17.2	8.9	10.440	34.42	14 20.80	14.06	9.13	15 55 3.05
20	15 44 53.38	50.92	19 49 52.7	44.9	10.474	33.53	14 6.39	14.25	9.24	15 58 59.61
21	15 49 5.17	2.75	20 2 66.6	59.1	10.508	32.61	13 51.16	14.44	9.35	16 2 56.16
22	15 53 17.76	15.38	20 15 58.4	51.2	10.541	31.69	13 35.13	14.62	9.46	16 6 52.72
23	15 57 31.15	28.81	20 28 27.9	21.1	10.574	30.76	13 18.30	14.80	9.57	16 10 49.28
24	16 1 45.34	43.04	20 40 34.7	28.3	10.607	29.80	13 0.67	14.97	9.68	16 14 45.83
25	16 5 60.31	58.06	20 52 18.6	12.5	10.639	28.84	12 42.25	15.13	9.78	16 18 42.39
26	16 10 16.03	13.83	21 3 39.9	33.3	10.671	27.86	12 23.08	15.29	9.88	16 22 38.95
27	16 14 32.50	30.35	21 14 35.8	30.4	10.701	26.87	12 3.17	15.45	9.98	16 26 35.50
28	16 18 49.70	47.61	21 25 8.3	3.3	10.731	25.86	11 42.53	15.61	10.07	16 30 32.06
29	16 23 7.62	5.58	21 35 16.5	11.8	10.760	24.84	11 21.18	15.76	10.17	16 34 28.62
30	16 27 26.22	24.24	21 44 60.3	55.8	10.789	23.81	10 59.14	15.91	10.26	16 38 25.17
Dec. 1	16 31 45.48	43.56	21 54 19.2	15.1	10.817	22.77	10 36.43	16.06	10.35	16 42 21.73
2	16 36 5.39	3.54	22 3 12.9	9.2	10.843	21.70	10 13.07	16.20	10.43	16 46 18.29
3	16 40 25.91	24.14	22 11 41.0	37.6	10.867	20.63	9 49.10	16.34	10.51	16 50 14.84
4	16 44 47.02	45.32	22 19 43.2	40.1	10.891	19.55	9 24.55	16.48	10.59	16 54 11.40
5	16 49 8.68	7.05	22 27 19.4	16.6	10.913	18.46	8 59.45	16.63	10.67	16 58 7.96
6	16 53 30.87	29.31	22 34 29.4	26.9	10.934	17.36	8 33.82	16.74	10.74	17 2 4.52
7	16 57 53.55	52.07	22 41 12.9	10.6	10.954	16.25	8 7.68	16.87	10.80	17 6 1.07
8	17 2 16.70	15.30	22 47 29.5	27.4	10.973	15.13	7 41.08	16.99	10.86	17 9 57.63
9	17 6 40.28	38.96	22 53 19.0	17.2	10.990	14.00	7 14.05	17.11	10.92	17 13 54.19
10	17 11 4.26	3.02	22 58 41.5	39.9	11.006	12.87	6 46.61	17.22	10.98	17 17 50.74
11	17 15 28.62	27.46	23 3 36.7	35.3	11.021	11.73	6 18.80	17.33	11.03	17 21 47.30
12	17 19 53.33	52.25	23 8 4.4	3.3	11.035	10.58	5 50.65	17.43	11.08	17 25 43.86
13	17 24 18.35	17.35	23 12 4.4	3.5	11.048	9.43	5 22.18	17.53	11.12	17 29 40.42
14	17 28 43.63	42.73	23 15 36.6	35.9	11.059	8.27	4 53.44	17.63	11.16	17 33 36.98
15	17 33 9.17	8.36	23 18 41.0	40.4	11.069	7.10	4 24.46	17.72	11.20	17 37 33.53
16	17 37 34.93	34.21	23 21 17.4	16.9	11.078	5.93	3 55.25	17.81	11.23	17 41 30.09
17	17 42 0.88	0.25	23 23 25.7	25.4	11.085	4.76	3 25.84	17.89	11.25	17 45 26.65
18	17 46 27.00	26.46	23 25 5.9	5.7	11.091	3.59	2 56.26	17.95	11.27	17 49 23.20
19	17 50 53.26	52.81	23 26 17.8	17.7	11.096	2.41	2 26.55	18.01	11.29	17 53 19.76
20	17 55 19.61	19.25	23 27 1.5	1.5	11.100	1.23	1 56.74	18.07	11.30	17 57 16.32
21	17 59 46.03	45.76	23 27 17.0	17.0	11.102	0.05	1 26.87	18.12	11.31	18 1 12.88
22	18 4 12.50	12.32	23 27 4.2	4.2	11.103	1.12	0 56.95	18.17	11.31	18 5 9.44
23	18 8 38.99	38.90	23 26 23.1	23.1	11.103	2.30	- 0 27.02	18.21	11.31	18 9 5.99
24	18 13 5.45	5.46	23 25 13.8	13.8	11.102	3.47	+ 0 2.89	18.25	11.29	18 13 2.55
25	18 17 31.86	31.96	23 23 36.3	36.3	11.099	4.67	0 32.76	18.28	11.28	18 16 59.11
26	18 21 58.19	58.38	23 21 30.6	30.6	11.095	5.82	1 2.55	18.30	11.26	18 20 55.67
27	18 26 24.40	24.63	23 18 56.8	56.7	11.089	7.00	1 32.21	18.32	11.24	18 24 52.22
28	18 30 50.45	50.83	23 15 54.8	54.5	11.082	8.16	2 1.70	18.33	11.21	18 28 48.78
29	18 35 16.31	16.78	23 12 24.7	24.3	11.073	9.32	2 31.00	18.34	11.18	18 32 45.34
30	18 39 41.95	42.51	23 8 26.8	26.3	11.063	10.48	3 0.10	18.35	11.15	18 36 41.90
31	18 44 7.33	7.97	23 4 1.3	0.6	11.051	11.63	3 28.93	18.35	11.11	18 40 38.45
32	18 48 32.41	33.13	22 59 8.2	7.4	11.038	12.78	+ 3 57.45	18.35	11.06	18 44 35.01

NOTE —For Mean Interval of Semidiameter passing the Meridian, subtract 0.19 from the Sidereal Interval.

# 332 MOON-CULMINATIONS, 1869.

WASHINGTON MERIDIAN.													
Date.	Mean Time of Meridian Transit.		Hourly Diff.	Sidereal Time of Semid. passing Merid.	Stars.	Bright Limb.	Date.	Mean Time of Meridian Transit.		Hourly Diff.	Sidereal Time of Semid. passing Merid.	Stars.	Bright Limb.
Jan.	1	h m	m	s	70 .. 73	II.	Mar.	1	h m	m	s	106 .. 109	II.
	2	15 36.72	2.305	69.74	81 .. 84	II.		2	15 39.65	2.192	68.13	110 .. 113	II.
	3	16 30.69	2.202	68.23	85 .. 88	II.		3	16 31.96	2.173	67.91	116 .. 119	II.
	4	17 22.41	2.123	67.07	95 .. 98	II.		4	17 23.94	2.159	67.76	124 .. 127	II.
	5	18 12.59	2.076	66.37	103 .. 106	II.		5	18 15.61	2.142	67.54	130 .. 133	II.
	6	19 2.05	2.061	66.15	108 .. 111	II.		6	19 6.77	2.114	67.11	137 .. 140	II.
	7	19 51.51	2.071	66.30	113 .. 116	II.		7	19 57.09	2.071	66.40	144 .. 147	II.
	8	20 41.44	2.093	66.61	122 .. 125	II.		8	20 46.16	2.013	65.43	155 .. 158	II.
	9	21 31.99	2.115	66.89		II.		9	21 33.72	1.948	64.32		II.
	10	22 22.96	2.122	66.94		II.		10	22 19.66	1.883	63.19		II.
	11	23 13.84	2.104	66.64		II.		11	23 4.09	1.825	62.20		II.
	12	0 3.97	2.060	65.94		II.		12	23 47.27	1.782	61.48		II.
	13	0 52.72	1.995	64.91		I.		13	0 29.64	1.760	61.10		I.
	14	1 39.72	1.920	63.75		I.		14	1 11.74	1.761	61.12		I.
	15	2 24.89	1.849	62.66	156 .. 159	I.		15	1 54.17	1.788	61.62	10 .. 13	I.
	16	3 8.47	1.793	61.79	164 .. 167	I.		16	2 37.59	1.843	62.59	15 .. 18	I.
	17	3 50.95	1.760	61.31	170 .. 173	I.		17	3 22.65	1.924	63.93	20 .. 23	I.
	18	4 32.97	1.757	61.32	2 .. 5	I.		18	4 9.93	2.026	65.63	28 .. 31	I.
	19	5 15.31	1.789	61.86	6 .. 9	I.		19	4 59.88	2.140	67.45	33 .. 36	I.
	20	5 58.84	1.856	62.96	10 .. 13	I.		20	5 52.64	2.251	69.18	38 .. 41	I.
	21	6 44.42	1.960	64.63	14 .. 17	I.		21	6 47.95	2.343	70.57	46 .. 49	I.
	22	7 32.93	2.095	66.70	19 .. 22	I.		22	7 45.12	2.400	71.41	59 .. 62	I.
	23	8 25.02	2.247	69.00	27 .. 30	I.		23	8 43.17	2.417	71.57	67 .. 70	I.
	24	9 20.81	2.393	71.12	32 .. 35	I.		24	9 41.11	2.397	71.17	75 .. 78	I.
	25	10 19.86	2.501	72.66	38 .. 41	I.		25	10 38.24	2.358	70.50	83 .. 86	I.
	26	11 20.87	2.546	73.26	45 .. 48	I.		26	11 34.31	2.317	69.83	92 .. 95	II.
	27	12 22.08	2.520	72.85	59 .. 62	II.		27	12 29.46	2.284	69.09	103 .. 106	II.
	28	13 21.85	2.441	71.66	68 .. 71	II.		28	13 23.93	2.263	69.02	108 .. 111	II.
	29	14 19.24	2.339	70.20	76 .. 79	II.		29	14 18.10	2.254	69.01	112 .. 115	II.
	30	15 14.11	2.242	68.79	83 .. 86	II.		30	15 12.13	2.246	68.82	122 .. 125	II.
	31	16 6.85	2.167	67.72	93 .. 96	II.		31	16 5.91	2.228	68.34	128 .. 131	II.
Feb.	1	16 58.11	2.120	67.05	102 .. 105	II.	Apr.	1	16 59.09	2.193	68.34	134 .. 137	II.
	2	17 48.61	2.096	66.80	108 .. 111	II.		2	17 51.18	2.138	67.52	141 .. 144	II.
	3	18 38.89	2.097	66.80	113 .. 116	II.		3	18 41.71	2.066	66.40	148 .. 151	II.
	4	19 29.28	2.103	66.86	120 .. 123	II.		4	19 30.35	1.986	65.12	154 .. 157	II.
	5	20 19.83	2.103	66.83	127 .. 130	II.		5	20 17.04	1.908	63.83	157 .. 160	II.
	6	21 10.24	2.088	66.54	133 .. 136	II.		6	21 1.93	1.841	62.67	171 .. 174	II.
	7	22 0.08	2.054	65.93	140 .. 143	II.		7	21 45.40	1.792	61.78		II.
	8	22 48.84	2.001	65.04		II.		8	22 27.93	1.764	61.27		II.
	9	23 36.14	1.937	63.97		II.		9	23 10.10	1.763	61.19		II.
	10	0 21.80	1.870	62.88		I.		10	23 52.54	1.787	61.59		II.
	11	1 5.92	1.812	61.95		I.		11	0 35.88	1.837	62.41		I.
	12	1 48.79	1.770	61.31		I.		12	1 20.74	1.912	63.63		I.
	13	2 30.90	1.752	61.05	173 .. 2	I.		13	2 7.64	2.004	65.16	19 .. 22	I.
	14	3 12.88	1.761	61.27	4 .. 7	I.		14	2 56.94	2.166	66.83	27 .. 30	I.
	15	3 55.44	1.802	61.98	9 .. 12	I.		15	3 48.71	2.202	68.41	31 .. 34	I.
	16	4 39.36	1.874	63.23	12 .. 15	I.		16	4 42.65	2.280	69.67	37 .. 40	I.
	17	5 25.42	1.978	64.92	18 .. 21	I.		17	5 38.14	2.326	70.32	43 .. 46	I.
	18	6 14.31	2.106	66.94	24 .. 27	I.		18	6 34.29	2.337	70.49	54 .. 57	I.
	19	7 6.52	2.245	69.07	30 .. 33	I.		19	7 30.30	2.300	70.18	63 .. 66	I.
	20	8 2.09	2.373	70.96	35 .. 38	I.		20	8 25.63	2.288	69.63	70 .. 73	I.
	21	9 0.45	2.466	72.28	40 .. 43	I.		21	9 20.15	2.259	69.13	81 .. 84	I.
	22	10 0.47	2.504	72.74	51 .. 54	I.		22	10 14.07	2.243	68.82	86 .. 89	I.
	23	11 0.67	2.487	72.40	62 .. 65	I.		23	11 7.80	2.244	68.81	96 .. 99	I.
	24	11 59.83	2.428	71.47	70 .. 73	I.		24	11 12.79	2.260	69.04	106 .. 109	I.
	25	12 57.24	2.352	70.34	81 .. 84	II.		25	12 56.27	2.279	69.40	110 .. 113	II.
	26	13 52.75	2.281	69.33	86 .. 89	II.		26	13 51.19	2.288	69.60	117 .. 120	II.
	27	14 46.72	2.227	68.58	97 .. 100	II.		27	14 46.11	2.274	69.47	125 .. 128	II.
	28	15 39.65	2.192	68.13	106 .. 109	II.		28	15 40.34	2.229	68.87	130 .. 133	II.
	29	16 31.96	2.173	67.91	110 .. 113	II.		29	16 33.09	2.154	67.78	139 .. 142	II.
	30	17 23.94	2.159	67.76	116 .. 119	II.		30	17 23.76	2.061	66.37	141 .. 144	II.

# MOON-CULMINATIONS, 1869. 333

## WASHINGTON MERIDIAN.

Date.	Mean Time of Meridian Transit.	Hourly Diff.	Sidereal Time of Semid. passing Merid.	Stars.	Bright Limb.	Date.	Mean Time of Meridian Transit.	Hourly Diff.	Sidereal Time of Semid. passing Merid.	Stars.	Bright Limb.
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>m</sup>	<sup>s</sup>				<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>m</sup>	<sup>s</sup>		
<b>May</b> 1	17 23.76	2.061	66.37	141 .. 144	II.	<b>July</b> 1	18 22.25	1.750	61.44	4 .. 7	II.
2	18 12.06	1.963	64.85	151 .. 154	II.	2	19 4.76	1.799	62.22	9 .. 12	II.
3	18 58.09	1.875	63.43	156 .. 159	II.	3	19 48.91	1.885	63.56	12 .. 15	II.
4	19 42.23	1.807	62.28	163 .. 166	II.	4	20 35.51	2.003	65.36	19 .. 22	II.
5	20 25.04	1.765	61.54	168 .. 171	II.	5	21 25.22	2.142	67.43		II.
6	21 7.19	1.753	61.27	173 .. 2	II.	6	22 18.30	2.280	69.44		II.
7	21 49.41	1.771	61.52	4 .. 7	II.	7	23 14.43	2.301	71.03		II.
8	22 32.42	1.819	62.26		II.	9	0 12.64	2.448	71.84		I.
9	23 16.93	1.895	63.45		II.	10	1 11.43	2.439	71.74		I.
11	0 3.57	1.994	64.98		I.	11	2 9.33	2.378	70.89	63 .. 66	I.
12	0 52.74	2.105	66.70		I.	12	3 5.39	2.292	69.68	71 .. 74	I.
13	1 44.54	2.210	68.36		I.	13	3 59.34	2.207	68.48	81 .. 84	I.
14	2 38.63	2.292	69.63	34 .. 37	I.	14	4 51.48	2.144	67.58	85 .. 88	I.
15	3 34.24	2.334	70.30	40 .. 43	I.	15	5 42.51	2.115	67.15	96 .. 99	I.
16	4 30.33	2.332	70.33	51 .. 54	I.	16	6 33.22	2.117	67.17	104 .. 107	I.
17	5 25.93	2.296	69.84	60 .. 63	I.	17	7 24.30	2.143	67.55	109 .. 112	I.
18	6 20.43	2.244	69.06	68 .. 71	I.	18	8 16.18	2.182	68.08	114 .. 117	I.
19	7 13.67	2.195	68.32	78 .. 81	I.	19	9 8.95	2.213	68.50	124 .. 127	I.
20	8 5.95	2.166	67.85	84 .. 87	I.	20	10 2.22	2.221	68.55	130 .. 133	I.
21	8 57.83	2.163	67.75	93 .. 96	I.	21	10 55.28	2.193	68.09	136 .. 139	I.
22	9 49.97	2.186	68.04	102 .. 105	I.	22	11 47.22	2.130	67.12	144 .. 147	I.
23	10 42.90	2.227	68.61	108 .. 111	I.	23	12 37.31	2.042	65.77	151 .. 154	II.
24	11 36.88	2.270	69.22	112 .. 115	I.	24	13 25.14	1.945	64.29	155 .. 158	II.
25	12 31.72	2.295	69.61	122 .. 125	II.	25	14 10.70	1.855	62.90	161 .. 164	II.
26	13 26.78	2.286	69.51	128 .. 131	II.	26	14 54.31	1.785	61.81	166 .. 169	II.
27	14 21.12	2.235	68.81	135 .. 138	II.	27	15 36.55	1.742	61.17	172 .. 1	II.
28	15 13.79	2.149	67.58	143 .. 146	II.	28	16 18.14	1.731	61.05	3 .. 6	II.
29	16 4.12	2.044	66.03	149 .. 152	II.	29	16 59.89	1.754	61.49	7 .. 10	II.
30	16 51.89	1.939	64.43	154 .. 157	II.	30	17 42.64	1.814	62.50	11 .. 14	II.
31	17 37.29	1.849	63.01	159 .. 162	II.	31	18 27.26	1.910	64.02	16 .. 19	II.
<b>June</b> 1	18 20.81	1.783	61.97	166 .. 169	II.	<b>Aug.</b> 1	19 14.55	2.035	65.96	21 .. 24	II.
2	19 3.14	1.750	61.40	171 .. 174	II.	2	20 5.09	2.178	68.09	28 .. 31	II.
3	19 45.06	1.750	61.37	3 .. 6	II.	3	20 59.07	2.317	70.10	34 .. 37	II.
4	20 27.42	1.786	61.90	6 .. 9	II.	4	21 56.05	2.424	71.59		II.
5	21 11.04	1.855	62.96	11 .. 14	II.	5	22 54.95	2.474	72.26		II.
6	21 56.69	1.955	64.50		II.	6	23 54.29	2.460	72.05		II.
7	22 45.04	2.078	66.35		II.	8	0 52.68	2.399	71.17		I.
8	23 36.46	2.205	68.24		II.	9	1 49.28	2.317	70.05		I.
10	0 30.74	2.313	69.86		I.	10	2 43.04	2.242	68.95	84 .. 87	I.
11	1 27.17	2.380	70.87		I.	11	3 37.04	2.188	68.20	93 .. 96	I.
12	2 24.54	2.391	71.08	45 .. 48	I.	12	4 29.16	2.162	67.86	103 .. 106	I.
13	3 21.54	2.351	70.55	50 .. 62	I.	13	5 20.99	2.162	67.89	108 .. 111	I.
14	4 17.14	2.280	69.57	67 .. 70	I.	14	6 13.05	2.178	68.15	112 .. 115	I.
15	5 10.93	2.204	68.48	74 .. 77	I.	15	7 5.56	2.196	68.38	122 .. 125	I.
16	6 3.07	2.145	67.60	83 .. 86	I.	16	7 58.34	2.199	68.39	128 .. 131	I.
17	6 54.12	2.117	67.13	90 .. 93	I.	17	8 50.92	2.177	68.00	135 .. 138	I.
18	7 44.83	2.117	67.13	98 .. 101	I.	18	9 42.61	2.126	67.15	142 .. 145	I.
19	8 35.94	2.147	67.53	106 .. 109	I.	19	10 32.78	2.051	65.95	148 .. 151	I.
20	9 28.01	2.194	68.19	110 .. 113	I.	20	11 20.97	1.964	64.57	154 .. 157	I.
21	10 21.26	2.241	68.83	119 .. 122	I.	21	12 7.05	1.878	63.20	156 .. 159	II.
22	11 15.39	2.265	69.17	126 .. 129	I.	22	12 51.20	1.805	62.04	165 .. 168	II.
23	12 9.70	2.252	68.97	132 .. 135	II.	23	13 33.84	1.753	61.23	171 .. 174	II.
24	13 3.17	2.107	68.16	140 .. 143	II.	24	14 15.57	1.729	60.87	3 .. 6	II.
25	13 54.89	2.108	66.86	147 .. 150	II.	25	14 57.06	1.734	61.02	6 .. 9	II.
26	14 44.24	2.003	65.30	153 .. 156	II.	26	15 39.05	1.770	61.70	10 .. 13	II.
27	15 31.08	1.902	63.76	157 .. 160	II.	27	16 22.30	1.839	62.87	13 .. 16	II.
28	16 15.67	1.818	62.46	164 .. 167	II.	28	17 7.57	1.938	64.50	19 .. 22	II.
29	16 58.55	1.761	61.59	169 .. 172	II.	29	17 55.52	2.061	66.42	26 .. 29	II.
30	17 40.47	1.738	61.24	174 .. 3	II.	30	18 46.57	2.193	68.42	30 .. 33	II.
31	18 22.25	1.750	61.44	4 .. 7	II.	31	19 40.74	2.315	70.19	36 .. 39	II.

# 334 MOON-CULMINATIONS, 1869.

## WASHINGTON MERIDIAN.

Date.	Mean Time of Meridian Transit.	Hourly Diff.	Sidereal Time of Semid. passing Merid.	Stars.	Bright Limb.	Date.	Mean Time of Meridian Transit.	Hourly Diff.	Sidereal Time of Semid. passing Merid.	Stars.	Bright Limb.
Sept. 1	<sup>h</sup> 20 <sup>m</sup> 37.48 <sup>s</sup> 2.406		<sup>s</sup> 71.43	42 .. 45	II.	Nov. 1	<sup>h</sup> 22 <sup>m</sup> 39.46 <sup>s</sup> 2.272		<sup>s</sup> 69.46		II.
2	21 35.79 2.445		71.95	54 .. 57	II.	2	23 34.49 2.317		70.09		II.
3	22 34.44 2.434		71.74		II.	4	0 30.69 2.365		70.82		I.
4	23 32.37 2.389		71.05		II.	5	1 27.88 2.396		71.31		I.
6	0 29.01 2.332		70.22		I.	6	2 25.39 2.388		71.28	127 .. 130	I.
7	1 24.35 2.283		69.53		I.	7	3 22.14 2.332		70.52	131 .. 134	I.
8	2 18.72 2.252		69.13		I.	8	4 17.01 2.234		69.12	141 .. 144	I.
9	3 12.57 2.241		69.03	106 .. 109	I.	9	5 9.19 2.112		67.31	148 .. 151	I.
10	4 6.37 2.243		69.11	111 .. 114	I.	10	5 58.37 1.987		65.41	154 .. 157	I.
11	5 0.23 2.245		69.19	119 .. 122	I.	11	6 44.70 1.878		63.66	157 .. 160	I.
12	5 54.02 2.234		69.05	126 .. 129	I.	12	7 28.72 1.795		62.27	165 .. 168	I.
13	6 47.30 2.202		68.54	131 .. 134	I.	13	8 11.09 1.742		61.35	170 .. 173	I.
14	7 39.51 2.143		67.63	140 .. 143	I.	14	8 52.59 1.722		60.96	2 .. 5	I.
15	8 30.02 2.064		66.36	146 .. 149	I.	15	9 34.03 1.736		61.12	5 .. 8	I.
16	9 18.52 1.977		64.91	152 .. 155	I.	16	10 16.17 1.781		61.80	9 .. 12	I.
17	10 4.91 1.891		63.49	157 .. 160	I.	17	10 59.73 1.853		62.94	13 .. 16	I.
18	10 49.37 1.817		62.27	163 .. 166	I.	18	11 45.30 1.947		64.02	19 .. 22	I.
19	11 32.29 1.763		61.37	168 .. 171	I.	19	12 33.28 2.052		66.05	26 .. 29	II.
20	12 14.19 1.733		60.88	174 .. 3	II.	20	13 23.74 2.151		67.60	31 .. 34	II.
21	12 55.70 1.730		60.85	4 .. 7	II.	21	14 16.33 2.226		68.82	36 .. 39	II.
22	13 37.46 1.755		61.30	9 .. 12	II.	22	15 10.32 2.265		69.49	42 .. 45	II.
23	14 20.15 1.807		62.22	12 .. 15	II.	23	16 4.77 2.265		69.54	51 .. 55	II.
24	15 4.41 1.885		63.55	18 .. 21	II.	24	16 58.83 2.236		69.14	63 .. 66	II.
25	15 50.81 1.985		65.19	23 .. 26	II.	25	17 52.01 2.195		68.55	69 .. 72	II.
26	16 39.76 2.095		66.95	29 .. 32	II.	26	18 44.24 2.161		68.03	79 .. 82	II.
27	17 31.36 2.204		68.63	34 .. 37	II.	27	19 35.91 2.150		67.82	84 .. 87	II.
28	18 25.38 2.293		69.96	39 .. 42	II.	28	20 27.67 2.169		68.06	94 .. 97	II.
29	19 21.17 2.350		70.76	48 .. 51	II.	29	21 20.26 2.219		68.74	103 .. 106	II.
30	20 17.88 2.369		70.98	59 .. 62	II.	30	22 14.33 2.290		69.74		II.
Oct 1	21 14.65 2.358		70.76	68 .. 71	II.	Dec. 1	23 10.16 2.361		70.78		I.
2	22 10.94 2.332		70.33		II.	3	0 7.47 2.407		71.44		I.
3	23 6.62 2.309		69.94		II.	4	1 5.34 2.404		71.42		I.
5	0 1.87 2.299		69.78		I.	5	2 2.41 2.341		70.56		I.
6	0 57.08 2.305		69.90		I.	6	2 57.36 2.231		68.99	145 .. 148	I.
7	1 52.56 2.320		70.18		I.	7	3 49.30 2.096		67.02	151 .. 154	I.
8	2 48.42 2.332		70.43	113 .. 116	I.	8	4 37.98 1.964		65.01	156 .. 159	I.
9	3 44.35 2.325		70.38	123 .. 126	I.	9	5 23.71 1.852		63.26	163 .. 166	I.
10	4 39.77 2.287		69.82	129 .. 132	I.	10	6 7.12 1.771		61.96	169 .. 172	I.
11	5 33.88 2.217		68.87	136 .. 139	I.	11	6 49.03 1.727		61.22	173 .. 2	I.
12	6 25.99 2.123		67.44	144 .. 147	I.	12	7 30.32 1.720		61.07	4 .. 7	I.
13	7 15.69 2.018		65.79	150 .. 153	I.	13	8 11.89 1.750		61.51	9 .. 12	I.
14	8 2.90 1.918		64.15	155 .. 158	I.	14	8 54.61 1.815		62.50	12 .. 15	I.
15	8 47.86 1.833		62.74	161 .. 164	I.	15	9 39.25 1.910		63.95	17 .. 20	I.
16	9 31.06 1.771		61.66	167 .. 170	I.	16	10 26.43 2.025		65.70	22 .. 25	I.
17	10 13.08 1.736		61.02	172 .. 1	I.	17	11 16.47 2.144		67.51	29 .. 32	I.
18	10 54.59 1.728		60.85	3 .. 6	I.	18	12 9.22 2.246		69.05	34 .. 37	II.
19	11 36.26 1.749		61.19	7 .. 10	I.	19	13 3.97 2.308		69.98	39 .. 42	II.
20	12 18.75 1.797		61.98	11 .. 14	II.	20	13 59.62 2.320		70.19	48 .. 51	II.
21	13 2.70 1.869		63.15	16 .. 19	II.	21	14 54.96 2.285		69.74	59 .. 62	II.
22	13 48.59 1.959		64.64	21 .. 24	II.	22	15 49.10 2.224		68.89	68 .. 71	II.
23	14 36.77 2.057		66.25	27 .. 30	II.	23	16 41.69 2.161		67.99	75 .. 78	II.
24	15 27.27 2.150		67.75	32 .. 35	II.	24	17 32.95 2.116		67.33	83 .. 86	II.
25	16 19.83 2.225		68.94	37 .. 40	II.	25	18 23.49 2.102		67.13	91 .. 94	II.
26	17 13.85 2.271		69.65	45 .. 48	II.	26	19 14.13 2.124		67.45	100 .. 103	II.
27	18 8.57 2.284		69.86	57 .. 60	II.	27	20 5.71 2.179		68.22	107 .. 110	II.
28	19 3.29 2.273		69.68	65 .. 68	II.	28	20 58.88 2.254		69.29	111 .. 114	II.
29	19 57.62 2.254		69.35	72 .. 75	II.	29	21 53.87 2.327		70.31	120 .. 123	II.
30	20 51.52 2.241		69.09	82 .. 85	II.	30	22 50.33 2.371		70.90	126 .. 129	II.
31	21 45.30 2.245		69.09		II.	31	23 47.26 2.363		70.77		II.
32	22 39.46 2.272		69.46		II.	33	0 43.22 2.291		69.89		I.



# MOON-CULMINATING STARS. 335

## MEAN PLACES FOR 1869.0.

No.	Name.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
1	$\delta$ Piscium . . .	6.5	<sup>h</sup> 0 <sup>m</sup> 13 <sup>s</sup> 51.52	+3.086	+ 7° 27' 45.9"	+20.07
2	44 Piscium . . .	6	0 18 41.32	3.075	+ 1 12 51.6	19.99
3	10 Ceti . . .	6	0 19 54.29	3.077	— 0 46 32.0	19.98
4	$\delta$ Piscium . . .	4.5	0 41 53.23	3.108	+ 6 52 18.4	19.71
5	$\epsilon$ PISCIMUM . . .	4	0 56 8.82	3.109	7 11 2.9	19.45
6	$\zeta^1$ Piscium . . .	5.4	1 6 53.30	+3.130	+ 6 52 55.1	+19.15
7	$\mu$ Piscium . . .	5	1 23 19.34	3.138	5 27 59.7	18.57
8	$\eta$ PISCIMUM . . .	4.3	1 24 28.52	3.199	14 40 10.4	18.71
9	$\gamma$ Piscium . . .	5.4	1 34 36.92	3.118	4 49 23.6	18.35
10	$\sigma$ PISCIMUM . . .	4	1 38 28.75	3.162	8 29 50.3	18.24
11	$\xi^1$ CETI . . .	4.5	2 6 3.50	+3.169	+ 8 13 51.4	+17.06
12	$\xi^2$ Ceti . . .	4	2 21 11.82	3.184	7 52 17.4	16.37
13	$\mu$ Ceti . . .	4	2 37 51.80	3.234	9 33 33.3	15.43
14	$\pi$ Arietis . . .	6.5	2 41 59.12	3.338	16 55 5.8	15.29
15	$\epsilon$ Arietis . . .	4.5	2 51 43.56	3.421	20 48 52.7	14.69
16	$\lambda$ Ceti . . .	6.5	2 52 42.09	+3.215	+ 8 23 3.5	+14.64
17	$\delta$ Arietis . . .	4.5	3 4 8.52	3.421	19 13 45.6	13.93
18	$\zeta$ ARIETIS . . .	4.5	3 7 22.52	3.436	20 33 25.8	13.65
19	$f$ Tauri . . .	4	3 23 38.71	3.306	12 29 7.6	12.65
20	$\eta$ TAURI . . .	3	3 39 42.04	3.553	23 41 51.8	11.46
21	$\epsilon$ Tauri . . .	5	3 41 5.31	+3.281	+10 44 16.1	+11.38
22	$\lambda$ Tauri . . .	3.4	3 53 25.49	3.317	12 7 5.1	10.53
23	$\Lambda^1$ Tauri . . .	5.4	3 56 57.19	3.537	21 43 17.1	10.20
24	$\gamma$ TAURI . . .	4	4 12 20.43	3.407	15 18 31.8	9.05
25	$\nu^1$ Tauri . . .	5.4	4 18 28.30	3.581	22 30 50.8	8.57
26	$\epsilon$ TAURI . . .	4.3	4 20 58.16	+3.495	+18 53 14.1	+ 8.37
27	$\alpha$ TAURI . . .	1	4 28 24.36	3.436	16 14 37.3	7.64
28	$\tau$ Tauri . . .	4.5	4 34 23.11	3.594	22 42 11.6	7.32
29	$\iota$ Tauri . . .	5	4 55 16.08	3.583	21 24 0.6	5.56
30	11 ORIONIS . . .	5	4 57 5.15	3.425	15 13 8.9	5.41
31	$\sigma$ Tauri . . .	6	5 19 46.06	+3.603	+21 49 20.7	+ 3.53
32	119 Tauri . . .	6.5	5 24 32.12	3.517	18 29 38.7	3.10
33	$\zeta$ Tauri . . .	3.4	5 29 49.08	3.586	21 3 36.2	2.61
34	$\chi^1$ Orionis . . .	5.4	5 46 37.52	3.552	20 14 56.6	+ 1.07
35	$\nu$ Orionis . . .	5.4	6 0 5.63	3.428	14 46 52.8	— 0.04
36	$\eta$ Geminorum . . .	3.4	6 6 58.22	+3.624	+22 32 30.9	— 0.62
37	$\mu$ GEMINORUM . . .	3	6 15 2.13	3.633	22 34 39.9	1.46
38	$\gamma$ GEMINORUM . . .	2.3	6 30 8.65	3.469	16 30 30.3	2.67
39	$\xi$ Geminorum . . .	4.3	6 37 56.33	3.373	13 2 2.9	3.47
40	$\zeta$ Geminorum . . .	4	6 56 20.33	3.566	20 45 35.7	4.90
41	$\lambda$ Geminorum . . .	4.3	7 10 33.91	+3.457	+16 46 27.6	— 6.08
42	$\delta$ GEMINORUM . . .	3.4	7 12 17.89	3.591	22 13 14.8	6.24
43	63 Geminorum . . .	6.5	7 19 57.80	3.570	21 42 39.4	6.93
44	6 Canis Minoris . . .	6.5	7 22 30.40	+3.347	+12 16 32.5	— 7.07

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MEAN PLACES FOR 1869.0.

No.	Name.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
45	68 Geminorum .	6.5	<sup>h</sup> 7 <sup>m</sup> 26 <sup>s</sup> 7.86	+3.431	+16° 6' 22.8"	— 7.32
46	<i>f</i> Geminorum .	6	7 31 54.66	3.475	17 58 12.6	7.83
47	1 Cancri . . .	6	7 49 33.19	3.418	16 8 16.6	9.22
48	5 Cancri . . .	6	7 54 2.21	3.428	16 48 51.6	9.53
49	8 Cancri . . .	6	7 57 46.62	3.351	13 29 21.6	9.91
50	$\mu^2$ Cancri . . .	5	8 0 3.22	+3.542	+21 57 41.9	—10.06
51	12 Cancri . . .	6	8 1 23.09	3.361	14 1 11.3	10.18
52	$\zeta^1$ Cancri . . .	5.4	8 4 41.88	3.453	18 2 26.4	10.49
53	$d^1$ Cancri . . .	6	8 15 51.66	3.448	18 45 2.8	11.21
54	29 Cancri . . .	6	8 21 18.73	3.358	14 38 31.3	11.67
55	$\theta$ Cancri . . .	6	8 24 7.48	+3.432	+18 32 6.9	—11.85
56	$c^1$ Cancri . . .	6	8 29 59.31	3.257	10 6 35.7	12.21
57	39 Cancri . . .	6	8 32 34.02	3.460	20 28 5.0	12.41
58	$\delta$ Cancri . . .	4	8 37 14.30	3.422	18 38 1.7	12.94
59	$A^2$ Cancri . . .	6	8 39 45.06	3.296	12 35 19.1	12.93
60	$\alpha$ Cancri . . .	4	8 51 19.27	+3.291	+12 21 47.2	—13.67
61	$\kappa$ CANCRI . . .	5	9 0 38.98	3.256	11 11 36.8	14.23
62	$\pi^2$ Cancri . . .	6	9 7 59.78	3.322	15 29 1.4	14.64
63	$\omega$ Leonis . . .	6	9 21 26.52	3.221	9 37 30.8	15.49
64	$\lambda$ Leonis . . .	6	9 24 56.18	3.226	10 17 30.0	15.69
65	10 Leonis . . .	5.6	9 30 17.74	+3.174	+ 7 25 20.6	—15.90
66	$\sigma$ Leonis . . .	4.3	9 34 9.77	3.226	10 29 12.3	16.18
67	B. A. C. 3336 .	5.6	9 39 15.41	3.169	7 18 45.2	16.39
68	$\pi$ Leonis . . .	5	9 53 17.45	3.180	8 40 17.2	17.10
69	$\alpha$ LEONIS . . .	1.2	10 1 23.63	3.204	12 36 23.2	17.42
70	43 Leonis . . .	6	10 16 9.19	+3.144	+ 7 12 24.6	—18.13
71	45 Leonis . . .	6	10 20 43.69	3.177	10 25 43.8	18.22
72	$\rho$ LEONIS . . .	4	10 25 54.76	3.166	9 58 46.6	18.42
73	34 Sextantis .	6	10 35 51.55	3.104	4 15 59.1	18.73
74	$l$ LEONIS . . .	5	10 42 22.14	3.160	11 14 15.1	18.94
75	55 Leonis . . .	6	10 48 58.19	+3.092	+ 1 26 7.4	—19.10
76	$d$ Leonis . . .	5	10 53 47.68	3.103	4 19 12.0	19.27
77	$c$ Leonis . . .	5	10 53 57.40	3.118	6 48 16.0	19.26
78	$\chi$ Leonis . . .	5	10 58 15.55	3.102	8 2 35.5	19.41
79	$p^5$ Leonis . . .	5	11 7 3.64	3.085	+ 0 38 33.5	19.57
80	$\phi$ Leonis . . .	5.4	11 10 0.13	+3.053	— 2 56 10.2	—19.63
81	$\sigma$ Leonis . . .	4	11 14 22.85	3.098	+ 6 44 48.1	19.68
82	79 Leonis . . .	6	11 17 19.03	3.084	+ 2 7 34.2	19.74
83	$\upsilon$ LEONIS . . .	5.4	11 30 14.54	3.072	— 0 6 2.7	19.86
84	$\beta$ Virginis . .	3.4	11 43 52.33	3.128	+ 2 30 9.5	20.29
85	10 Virginis . .	6	12 2 58.52	+3.074	+ 2 37 59.2	—20.28
86	$\eta$ VIRGINIS . .	3.4	12 13 12.27	3.068	+ 0 3 41.1	20.05
87	$q$ Virginis . .	6	12 27 1.21	3.092	— 8 43 44.3	19.89
88	$f$ Virginis . .	6	12 30 2.68	+3.086	— 5 6 39.5	—19.97

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## MEAN PLACES FOR 1869.0.

No.	Name.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
89	$\chi$ Virginis . .	5	<sup>h</sup> 12 <sup>m</sup> 32 <sup>s</sup> 29.53	+3.095	— 7° 16' 25.6"	—19.90
90	$\gamma$ Virginis . .	3.2	12 35 1.46	3.040	0 43 50.9	19.84
91	28 Virginis . .	6	12 35 11.48	3.100	6 46 42.8	19.84
92	38 Virginis . .	6	12 46 28.89	3.073	2 50 26.7	19.67
93	$\psi$ Virginis . .	5	12 47 32.62	3.117	8 49 36.8	19.64
94	$k$ Virginis . .	6	12 52 54.84	+3.089	— 3 6 12.4	—19.49
95	48 Virginis . .	6	12 57 9.45	3.086	2 57 25.2	19.46
96	$\theta$ VIRGINIS . .	4.5	13 3 10.18	3.101	4 50 20.3	19.34
97	$\alpha$ VIRGINIS . .	1	13 18 17.68	3.153	10 28 35.8	18.93
98	$\rho$ Virginis . .	5	13 25 9.51	3.117	5 34 43.1	18.74
99	$\lambda$ Virginis . .	5	13 26 4.27	+3.153	— 9 29 21.0	—18.70
100	$m$ Virginis . .	6	13 34 44.33	3.143	8 2 28.8	18.35
101	83 Virginis . .	6	13 37 26.05	3.227	15 31 13.0	18.33
102	86 Virginis . .	6	13 38 57.68	3.188	11 46 8.7	18.21
103	89 Virginis . .	5	13 42 45.45	3.249	17 28 50.4	18.12
104	94 Virginis . .	6	13 59 21.76	+3.169	— 8 15 54.8	—17.37
105	$\kappa$ Virginis . .	4.5	14 5 54.73	3.197	9 39 49.3	17.09
106	$\lambda$ Virginis . .	5.4	14 12 1.53	3.239	12 46 0.5	16.79
107	2 Libræ . .	6	14 16 22.79	3.219	11 6 52.7	16.70
108	5 Libræ . .	6	14 38 44.58	3.300	11 54 22.2	15.46
109	$\alpha^2$ LIBRÆ . .	2.3	14 43 38.09	+3.306	—15 29 43.5	—15.21
110	$\epsilon^1$ Libræ . .	5.4	15 4 45.57	3.410	19 17 37.8	13.90
111	$\zeta^1$ Libræ . .	4	15 20 52.40	3.376	16 15 28.0	12.86
112	$\gamma$ Libræ . .	4.5	15 28 12.03	3.346	14 21 1.4	12.31
113	$\theta$ Libræ . .	5.4	15 46 22.28	3.412	16 20 33.4	10.91
114	$\delta$ SCORPII . .	2.3	15 52 35.45	+3.536	—22 14 46.9	—10.59
115	$\beta^1$ SCORPII . .	2	15 57 49.31	3.477	19 26 40.0	10.21
116	$\nu^2$ Scorpii . .	4	16 4 23.14	3.480	19 7 3.1	9.66
117	$\sigma$ Scorpii . .	3.4	16 13 13.78	3.637	25 16 32.1	9.01
118	$\psi$ Ophiuchi . .	5	16 16 26.40	3.503	19 43 41.7	8.81
119	$\chi$ Ophiuchi . .	6	16 19 26.07	+3.470	—18 9 22.8	— 8.51
120	$\alpha$ SCORPII . .	1.2	16 21 22.74	3.668	26 8 18.1	8.39
121	$\omega$ Ophiuchi . .	5	16 24 22.49	3.548	21 11 2.1	8.05
122	B. A. C. 5579 .	5	16 33 59.95	3.463	17 29 8.8	7.32
123	20 Ophiuchi . .	5	16 42 35.33	3.313	10 32 55.1	6.72
124	29 Ophiuchi . .	6	16 54 11.53	+3.503	—18 41 20.5	— 5.67
125	$\eta$ Ophiuchi . .	2.3	17 2 52.02	3.436	15 33 35.0	4.83
126	$\nu$ Serpentis . .	5.4	17 13 27.62	3.372	12 42 38.9	4.02
127	$\theta$ Ophiuchi . .	3.4	17 13 58.00	3.681	24 51 57.3	4.05
128	$\xi$ Serpentis . .	4.3	17 30 5.20	3.434	15 18 47.2	2.65
129	$\circ$ Serpentis . .	5.4	17 34 3.17	+3.369	—12 48 8.8	— 2.29
130	4 Sagittarii . .	5	17 51 47.67	3.661	23 48 3.1	— 0.73
131	$\mu^1$ SAGITTARII .	4	18 5 55.75	+3.586	—21 5 25.3	+ 0.51

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MEAN PLACES FOR 1869.0.

No.	Name.	Magni- tude.	Right Ascension.	Annual Variation.	Declination.	Annual Variation.
132	21 Sagittarii . .	5	<sup>h</sup> 18 <sup>m</sup> 17 <sup>s</sup> 32.85	+3.574	—20° 36' 32.2	+ 1.52
133	λ Sagittarii . .	3	18 19 53.17	3.707	25 29 29.5	1.51
134	B. A. C. 6279 . .	5.4	18 21 43.92	3.419	14 38 49.0	1.88
135	24 Sagittarii . .	6	18 25 53.42	3.667	24 7 35.0	2.26
136	ν <sup>1</sup> Sagittarii . .	5	18 46 15.54	3.626	22 54 10.3	4.03
137	ξ <sup>2</sup> Sagittarii . .	4	18 49 54.72	+3.582	—21 16 33.5	+ 4.34
138	ο Sagittarii . .	4	18 56 49.83	3.599	21 55 48.8	4.90
139	π Sagittarii . .	3	19 1 58.25	3.574	21 13 43.6	5.37
140	d SAGITTARII . .	5	19 9 58.18	3.515	19 11 1.1	6.03
141	ρ <sup>1</sup> Sagittarii . .	4	19 14 4.45	3.487	18 5 27.3	6.43
142	υ Sagittarii . .	5.4	19 14 13.48	+3.445	—16 11 55.3	+ 6.34
143	ε <sup>2</sup> Sagittarii . .	5	19 35 1.44	3.438	16 25 40.4	8.12
144	f Sagittarii . .	5	19 38 43.12	3.506	20 4 23.1	8.35
145	g Sagittarii . .	6.5	19 50 31.20	3.409	15 50 12.2	9.25
146	63 Sagittarii . .	6	19 54 38.19	3.366	13 59 47.6	9.69
147	ξ <sup>2</sup> Capricorni . .	6	20 5 7.96	+3.350	—12 59 51.6	+10.26
148	α <sup>2</sup> CAPRICORNI . .	3.4	20 10 47.04	3.333	12 56 55.2	10.84
149	ρ Capricorni . .	5	20 21 23.09	3.431	18 14 39.2	11.63
150	τ <sup>2</sup> Capricorni . .	5	20 31 56.67	3.363	15 24 45.2	12.31
151	ε Aquarii . .	4.3	20 40 35.05	3.257	9 58 24.0	12.91
152	μ AQUARII . .	5.4	20 45 35.13	+3.241	— 9 28 22.6	+13.22
153	ο Capricorni . .	4	20 58 34.87	3.384	17 45 3.4	14.07
154	ν Aquarii . .	4.5	21 2 27.26	3.274	11 54 0.8	14.34
155	β AQUARII . .	3	21 24 39.67	3.164	6 8 45.6	15.62
156	ξ AQUARII . .	5.4	21 30 46.57	3.199	8 26 25.0	15.91
157	λ Capricorni . .	5.6	21 39 28.88	+3.238	—11 58 7.0	+16.42
158	ο AQUARII . .	4.5	22 9 55.17	3.171	8 26 4.3	17.76
159	ρ Aquarii . .	5.6	22 13 18.29	3.163	8 28 38.6	17.97
160	γ Aquarii . .	4.3	22 14 53.42	3.105	2 2 46.3	18.03
161	ζ Aquarii . .	3.4	22 22 5.11	3.091	0 41 20.6	18.31
162	σ Aquarii . .	5.4	22 23 42.69	+3.182	—11 20 48.1	+18.40
163	η AQUARII . .	4.3	22 28 37.44	3.084	0 47 30.7	18.42
164	κ Aquarii . .	5	22 30 58.24	3.113	4 54 10.0	18.47
165	78 Aquarii . .	6	22 47 44.91	3.128	— 7 53 55.6	19.09
166	β Piscium . .	5.4	22 57 12.75	3.057	+ 3 6 55.0	19.30
167	φ Aquarii . .	4.5	23 7 32.30	+3.113	— 6 45 16.5	+19.37
168	γ Piscium . .	4	23 10 22.44	3.110	+ 2 34 1.7	19.63
169	κ Piscium . .	5.4	23 20 13.11	3.079	0 32 19.5	19.66
170	ι PISCIMUM . .	4.5	23 33 12.82	3.085	4 54 59.0	19.47
171	19 Piscium . .	6	23 39 42.14	3.067	2 45 40.2	20.00
172	26 Piscium . .	6	23 48 25.85	+3.068	+ 6 20 36.4	+20.05
173	ω PISCIMUM . .	4	23 52 35.13	3.078	6 8 16.6	19.91
174	c <sup>2</sup> Piscium . .	6	23 55 48.19	+3.066	+ 7 45 29.6	+20.02

## FOR WASHINGTON MEAN NOON AND MIDNIGHT.

Date.	JANUARY.			FEBRUARY.			MARCH.		
	Semi-diameter.	Horizontal Parallax.	Hourly Diff.	Semi-diameter.	Horizontal Parallax.	Hourly Diff.	Semi-diameter.	Horizontal Parallax.	Hourly Diff.
d									
1.0	16 27.3	60 17.1	—0.54	16 13.2	59 25.1	—2.00	16 21.8	59 56.6	—2.14
1.5	16 25.2	60 9.2	0.79	16 6.6	59 0.8	2.06	16 14.5	59 30.0	2.29
2.0	16 22.3	59 58.5	0.99	15 59.8	58 35.9	2.09	16 6.9	59 2.0	2.37
2.5	16 18.8	59 45.6	1.16	15 53.0	58 10.9	2.08	15 59.1	58 33.3	2.40
3.0	16 14.7	59 30.8	1.30	15 46.3	57 46.3	2.02	15 51.3	58 4.6	2.38
3.5	16 10.3	59 14.7	1.39	15 39.8	57 22.5	1.95	15 43.6	57 36.4	2.32
4.0	16 5.7	58 57.7	1.45	15 33.6	56 59.7	1.85	15 36.2	57 9.1	2.23
4.5	16 0.9	58 40.2	1.47	15 27.7	56 38.1	1.75	15 29.1	56 43.1	2.10
5.0	15 56.1	58 22.5	1.47	15 22.2	56 17.8	1.63	15 22.5	56 18.7	1.96
5.5	15 51.3	58 4.9	1.45	15 17.0	55 58.9	1.51	15 16.3	55 56.2	1.81
6.0	15 46.5	57 47.3	1.44	15 12.3	55 41.5	1.39	15 10.7	55 35.6	1.64
6.5	15 41.8	57 29.9	1.43	15 8.0	55 25.6	1.27	15 5.6	55 17.0	1.46
7.0	15 37.2	57 12.8	1.41	15 4.0	55 11.1	1.15	15 1.1	55 0.4	1.29
7.5	15 32.6	56 56.1	1.37	15 0.4	54 58.0	1.04	14 57.2	54 45.9	1.12
8.0	15 28.2	56 39.9	1.33	14 57.2	54 46.2	0.93	14 53.8	54 33.4	0.96
8.5	15 23.9	56 24.2	1.28	14 54.4	54 35.7	0.82	14 50.9	54 22.9	0.80
9.0	15 19.8	56 9.1	1.24	14 51.9	54 26.5	0.71	14 48.5	54 14.2	0.64
9.5	15 15.8	55 54.5	1.19	14 49.8	54 18.7	0.61	14 46.7	54 7.4	0.49
10.0	15 12.0	55 40.6	1.13	14 48.0	54 12.1	0.51	14 45.3	54 2.3	0.36
10.5	15 8.5	55 27.5	1.07	14 46.5	54 6.6	0.41	14 44.4	53 58.8	0.23
11.0	15 5.1	55 15.0	1.02	14 45.3	54 2.3	0.31	14 43.8	53 56.8	—0.11
11.5	15 1.8	55 3.1	0.96	14 44.4	53 59.2	0.21	14 43.6	53 56.2	0.00
12.0	14 58.8	54 52.0	0.90	14 43.9	53 57.3	—0.11	14 43.8	53 57.0	+0.12
12.5	14 56.0	54 41.7	0.83	14 43.8	53 56.7	+0.01	14 44.4	53 59.0	0.23
13.0	14 53.5	54 32.3	0.75	14 44.0	53 57.6	0.14	14 45.3	54 2.3	0.33
13.5	14 51.2	54 23.9	0.66	14 44.7	54 0.1	0.28	14 46.5	54 6.9	0.43
14.0	14 49.2	54 16.7	0.55	14 45.8	54 4.2	0.41	14 48.1	54 12.7	0.54
14.5	14 47.6	54 10.8	0.44	14 47.4	54 9.9	0.55	14 50.0	54 19.8	0.64
15.0	14 46.4	54 6.3	0.31	14 49.4	54 17.4	0.71	14 52.3	54 28.2	0.75
15.5	14 45.5	54 3.4	0.17	14 52.0	54 26.9	0.87	14 55.0	54 38.0	0.87
16.0	14 45.2	54 2.3	—0.01	14 55.1	54 38.4	1.04	14 58.0	54 49.2	0.99
16.5	14 45.5	54 3.2	+0.15	14 58.8	54 51.9	1.21	15 1.5	55 1.8	1.11
17.0	14 46.3	54 6.2	0.33	15 3.1	55 7.5	1.39	15 5.3	55 15.9	1.24
17.5	14 47.7	54 11.3	0.52	15 7.9	55 25.2	1.56	15 9.6	55 31.6	1.37
18.0	14 49.8	54 18.7	0.72	15 13.3	55 45.0	1.74	15 14.3	55 48.8	1.50
18.5	14 52.4	54 28.5	0.92	15 19.2	56 6.9	1.91	15 19.4	56 7.5	1.63
19.0	14 55.8	54 40.8	1.12	15 25.7	56 30.7	2.06	15 24.9	56 27.8	1.75
19.5	14 59.8	54 55.6	1.33	15 32.7	56 56.3	2.20	15 30.8	56 49.5	1.87
20.0	15 4.5	55 12.8	1.53	15 40.1	57 23.4	2.31	15 37.1	57 12.5	1.97
20.5	15 9.8	55 32.4	1.73	15 47.8	57 51.7	2.39	15 43.7	57 36.7	2.06
21.0	15 15.8	55 54.2	1.92	15 55.6	58 20.7	2.43	15 50.5	58 1.8	2.12
21.5	15 22.3	56 18.2	2.08	16 3.6	58 49.9	2.42	15 57.5	58 27.4	2.15
22.0	15 29.3	56 44.0	2.21	16 11.4	59 18.6	2.36	16 4.5	58 53.1	2.14
22.5	15 36.7	57 11.2	2.32	16 18.9	59 46.1	2.23	16 11.4	59 18.5	2.08
23.0	15 44.4	57 39.6	2.40	16 25.9	60 11.8	2.04	16 18.0	59 42.8	1.98
23.5	15 52.3	58 8.6	2.43	16 32.2	60 34.8	1.79	16 24.2	60 5.5	1.82
24.0	16 0.2	58 37.6	2.40	16 37.5	60 54.5	1.48	16 29.8	60 26.0	1.60
24.5	16 8.0	59 5.9	2.32	16 41.8	61 10.1	1.12	16 34.5	60 43.6	1.33
25.0	16 15.3	59 32.8	2.18	16 44.8	61 21.2	0.72	16 38.3	60 57.6	1.02
25.5	16 22.0	59 57.6	1.97	16 46.4	61 27.3	+0.30	16 41.0	61 7.5	0.67
26.0	16 28.0	60 19.7	1.71	16 46.7	61 28.2	—0.13	16 42.5	61 12.9	+0.28
26.5	16 33.1	60 38.4	1.40	16 45.6	61 24.0	0.56	16 42.7	61 13.6	—0.14
27.0	16 37.1	60 53.1	1.05	16 43.1	61 14.8	0.97	16 41.6	61 9.4	0.55
27.5	16 39.9	61 3.4	0.67	16 39.3	61 0.9	1.34	16 39.2	61 0.5	0.94
28.0	16 41.5	61 9.0	+0.27	16 34.3	60 42.8	1.66	16 35.5	60 47.1	1.29
28.5	16 41.7	61 9.8	—0.13	16 28.4	60 21.1	1.93	16 30.8	60 29.6	1.62
29.0	16 40.6	61 5.9	0.52	16 21.8	59 56.6	—2.14	16 25.0	60 8.5	1.90
29.5	16 38.3	60 57.5	0.88	$\Delta s = .273 \Delta \pi$			16 18.5	59 44.4	2.11
30.0	16 34.9	60 45.0	1.20				16 11.3	59 18.1	2.27
30.5	16 30.6	60 28.9	1.48				16 3.7	58 50.3	2.37
31.0	16 25.4	60 9.8	1.70				15 55.9	58 21.5	2.42
31.5	16 19.5	59 48.3	—1.88				15 48.0	57 52.5	—2.41

FOR WASHINGTON MEAN NOON AND MIDNIGHT.									
Date.	APRIL.			MAY.			JUNE.		
	Semi-diameter.	Horizontal Parallax.	Hourly Diff.	Semi-diameter.	Horizontal Parallax.	Hourly Diff.	Semi-diameter.	Horizontal Parallax.	Hourly Diff.
d									
1.0	15 40.2	57 23.9	-2.35	15 14.4	55 49.3	-1.80	14 51.1	54 23.4	-0.56
1.5	15 32.7	56 56.2	2.26	15 8.8	55 28.8	1.64	14 49.6	54 18.0	0.35
2.0	15 25.5	56 29.9	2.13	15 3.8	55 10.3	1.46	14 48.8	54 15.3	-0.13
2.5	15 18.8	56 5.3	1.98	14 59.4	54 54.0	1.26	14 48.8	54 15.1	+0.08
3.0	15 12.6	55 42.6	1.81	14 55.6	54 40.2	1.05	14 49.4	54 17.5	0.29
3.5	15 7.0	55 22.1	1.62	14 52.5	54 28.9	0.84	14 50.7	54 22.3	0.50
4.0	15 2.0	55 3.8	1.43	14 50.1	54 20.1	0.63	14 52.7	54 29.5	0.70
4.5	14 57.7	54 47.8	1.23	14 48.4	54 13.9	0.42	14 55.3	54 39.0	0.88
5.0	14 54.0	54 34.2	1.03	14 47.4	54 10.2	0.21	14 58.4	54 50.6	1.04
5.5	14 50.9	54 23.1	0.83	14 47.1	54 8.9	-0.01	15 2.1	55 4.1	1.19
6.0	14 48.6	54 14.3	0.64	14 47.4	54 10.0	+0.18	15 6.2	55 19.2	1.31
6.5	14 46.8	54 7.8	0.45	14 48.3	54 13.3	0.37	15 10.7	55 35.6	1.42
7.0	14 45.6	54 3.5	0.27	14 49.7	54 18.7	0.53	15 15.5	55 53.1	1.49
7.5	14 45.0	54 1.2	-0.11	14 51.7	54 25.9	0.67	15 20.4	56 11.4	1.54
8.0	14 44.9	54 0.9	+0.05	14 54.2	54 34.9	0.80	15 25.5	56 30.1	1.56
8.5	14 45.3	54 2.4	0.20	14 57.0	54 45.3	0.92	15 30.6	56 48.9	1.56
9.0	14 46.2	54 5.6	0.33	15 0.2	54 57.0	1.02	15 35.7	57 7.5	1.53
9.5	14 47.5	54 10.3	0.45	15 3.6	55 9.7	1.10	15 40.6	57 25.5	1.48
10.0	14 49.1	54 16.4	0.56	15 7.4	55 23.4	1.17	15 45.3	57 42.8	1.40
10.5	14 51.1	54 23.7	0.66	15 11.3	55 37.7	1.22	15 49.7	57 59.1	1.31
11.0	14 53.4	54 32.1	0.74	15 15.3	55 52.5	1.25	15 53.8	58 14.1	1.21
11.5	14 56.0	54 41.6	0.82	15 19.4	56 7.6	1.26	15 57.5	58 27.6	1.09
12.0	14 58.8	54 52.0	0.90	15 23.5	56 22.9	1.27	16 0.8	58 39.6	0.94
12.5	15 1.9	55 3.3	0.98	15 27.7	56 38.2	1.27	16 3.6	58 50.0	0.80
13.0	15 5.2	55 15.5	1.05	15 31.8	56 53.4	1.26	16 6.0	58 58.8	0.67
13.5	15 8.8	55 28.5	1.12	15 35.9	57 8.4	1.24	16 8.0	59 5.9	0.53
14.0	15 12.6	55 42.4	1.19	15 40.0	57 23.1	1.22	16 9.5	59 11.5	0.40
14.5	15 16.6	55 57.0	1.25	15 43.9	57 37.6	1.19	16 10.6	59 15.5	0.28
15.0	15 20.7	56 12.3	1.31	15 47.7	57 51.6	1.16	16 11.3	59 18.0	0.16
15.5	15 25.1	56 28.4	1.37	15 51.4	58 5.3	1.12	16 11.6	59 19.2	+0.05
16.0	15 29.6	56 45.2	1.43	15 55.0	58 18.5	1.08	16 11.5	59 19.1	-0.06
16.5	15 34.4	57 2.7	1.49	15 58.5	58 31.1	1.04	16 11.1	59 17.7	0.17
17.0	15 39.4	57 20.9	1.54	16 1.8	58 43.2	0.98	16 10.4	59 15.0	0.27
17.5	15 44.4	57 39.6	1.58	16 4.9	58 54.6	0.92	16 9.4	59 11.1	0.37
18.0	15 49.6	57 58.7	1.60	16 7.8	59 5.3	0.85	16 8.0	59 6.1	0.47
18.5	15 54.9	58 18.0	1.62	16 10.4	59 15.0	0.77	16 6.2	58 59.7	0.57
19.0	16 0.2	58 37.4	1.62	16 12.7	59 23.6	0.67	16 4.1	58 52.2	0.68
19.5	16 5.4	58 56.7	1.59	16 14.7	59 30.8	0.55	16 1.8	58 43.4	0.78
20.0	16 10.5	59 15.3	1.52	16 16.3	59 36.6	0.41	15 59.1	58 33.3	0.89
20.5	16 15.3	59 32.9	1.41	16 17.4	59 40.5	0.25	15 56.0	58 22.0	0.99
21.0	16 19.7	59 49.1	1.28	16 17.9	59 42.5	+0.08	15 52.6	58 9.4	1.09
21.5	16 23.6	60 3.4	1.11	16 17.8	59 42.2	-0.11	15 48.8	57 55.7	1.19
22.0	16 26.9	60 15.4	0.89	16 17.1	59 39.5	0.32	15 44.8	57 40.9	1.27
22.5	16 29.4	60 24.6	0.64	16 15.7	59 34.3	0.53	15 40.5	57 26.1	1.35
23.0	16 31.0	60 30.6	0.36	16 13.6	59 26.6	0.75	15 36.0	57 8.6	1.41
23.5	16 31.7	60 33.0	+0.05	16 10.8	59 16.2	0.96	15 31.4	56 51.6	1.45
24.0	16 31.3	60 31.7	-0.27	16 7.3	59 3.5	1.15	15 26.6	56 34.0	1.46
24.5	16 29.9	60 26.5	0.59	16 3.2	58 48.5	1.34	15 21.8	56 16.5	1.46
25.0	16 27.5	60 17.5	0.91	15 58.5	58 31.3	1.50	15 17.1	55 59.1	1.43
25.5	16 24.0	60 4.8	1.21	15 53.4	58 12.5	1.63	15 12.5	55 42.2	1.38
26.0	16 19.6	59 48.7	1.48	15 47.9	57 52.2	1.73	15 8.1	55 26.1	1.31
26.5	16 14.4	59 29.6	1.71	15 42.1	57 31.0	1.80	15 4.0	55 11.0	1.22
27.0	16 8.5	59 7.9	1.90	15 36.2	57 9.1	1.83	15 0.2	54 57.2	1.10
27.5	16 2.1	58 44.2	2.05	15 30.2	56 47.2	1.83	14 56.9	54 44.9	0.96
28.0	15 55.2	58 19.1	2.14	15 24.3	56 25.5	1.79	14 54.0	54 34.4	0.80
28.5	15 48.2	57 53.2	2.18	15 18.6	56 4.5	1.71	14 51.7	54 25.9	0.62
29.0	15 41.0	57 27.0	2.18	15 13.2	55 44.6	1.61	14 50.0	54 19.6	0.44
29.5	15 33.9	57 1.0	2.14	15 8.1	55 26.1	1.48	14 48.9	54 15.7	0.24
30.0	15 27.1	56 35.7	2.06	15 3.5	55 9.3	1.33	14 48.5	54 14.1	-0.03
30.5	15 20.5	56 11.7	1.94	14 59.5	54 54.4	1.16	14 48.8	54 15.1	+0.18
31.0	15 14.4	55 49.3	1.80	14 56.0	54 41.7	0.97			
31.5	15 8.8	55 28.8	-1.64	14 53.2	54 31.3	-0.77			

$\Delta s = .273 \Delta \pi$

 $\Delta s = 273 \Delta \pi$

## FOR WASHINGTON MEAN NOON AND MIDNIGHT.

Date.	JULY.			AUGUST.			SEPTEMBER.		
	Semi-diameter.	Horizontal Parallax.	Hourly Diff.	Semi-diameter.	Horizontal Parallax.	Hourly Diff.	Semi-diameter.	Horizontal Parallax.	Hourly Diff.
1.0	14 49.8	54 18.7	+0.39	15 9.8	55 32.4	+1.67	15 49.3	57 57.7	+2.40
1.5	14 51.5	54 24.8	0.61	15 15.6	55 53.6	1.84	15 57.2	58 26.7	2.41
2.0	14 53.5	54 33.4	0.82	15 21.9	56 16.6	1.99	16 5.1	58 55.4	2.37
2.5	14 56.8	54 44.6	1.02	15 28.6	56 41.3	2.11	16 12.7	59 23.2	2.27
3.0	15 0.5	54 58.1	1.22	15 35.6	57 7.2	2.20	16 19.8	59 49.5	2.11
3.5	15 4.8	55 13.9	1.40	15 42.8	57 33.9	2.25	16 26.4	60 13.5	1.89
4.0	15 9.7	55 31.6	1.56	15 50.2	58 0.9	2.25	16 32.1	60 34.5	1.61
4.5	15 15.0	55 51.2	1.69	15 57.5	58 27.6	2.21	16 36.8	60 52.0	1.29
5.0	15 20.7	56 12.2	1.80	16 4.6	58 53.6	2.12	16 40.4	61 5.2	0.92
5.5	15 26.7	56 34.4	1.88	16 11.2	59 18.0	1.97	16 42.8	61 13.9	0.53
6.0	15 32.9	56 57.3	1.93	16 17.3	59 40.4	1.77	16 43.8	61 17.7	+0.12
6.5	15 39.2	57 20.5	1.93	16 22.7	60 0.1	1.52	16 43.5	61 16.6	-0.29
7.0	15 45.5	57 43.5	1.90	16 27.2	60 16.6	1.24	16 41.9	61 10.7	0.69
7.5	15 51.6	58 5.9	1.84	16 30.7	60 29.5	0.93	16 39.1	61 0.2	1.06
8.0	15 57.4	58 27.3	1.73	16 33.2	60 38.5	0.59	16 35.1	60 45.5	1.38
8.5	16 2.8	58 47.1	1.58	16 34.5	60 43.4	+0.25	16 30.1	60 27.2	1.66
9.0	16 7.7	59 4.9	1.40	16 34.7	60 44.1	-0.09	16 24.3	60 6.0	1.88
9.5	16 11.9	59 20.4	1.19	16 33.8	60 40.9	0.42	16 17.9	59 42.4	2.04
10.0	16 15.4	59 33.3	0.96	16 31.9	60 33.8	0.73	16 11.0	59 17.2	2.16
10.5	16 18.1	59 43.3	0.72	16 29.1	60 23.3	1.00	16 3.9	58 50.9	2.22
11.0	16 20.0	59 50.5	0.48	16 25.4	60 9.8	1.23	15 56.7	58 24.4	2.22
11.5	16 21.2	59 54.7	+0.24	16 21.0	59 53.9	1.41	15 49.5	57 57.9	2.19
12.0	16 21.6	59 56.0	0.00	16 16.1	59 35.9	1.56	15 42.4	57 32.2	2.12
12.5	16 21.2	59 54.7	-0.22	16 10.8	59 16.4	1.67	15 35.6	57 7.3	2.03
13.0	16 20.2	59 50.8	0.41	16 5.2	58 56.0	1.73	15 29.2	56 43.7	1.92
13.5	16 18.5	59 44.7	0.59	15 59.5	58 35.0	1.76	15 23.2	56 21.5	1.79
14.0	16 16.3	59 36.6	0.75	15 53.8	58 13.9	1.76	15 17.6	56 0.9	1.65
14.5	16 13.6	59 26.7	0.88	15 48.1	57 52.9	1.74	15 12.4	55 41.9	1.51
15.0	16 10.6	59 15.5	0.98	15 42.5	57 32.3	1.69	15 7.7	55 24.6	1.37
15.5	16 7.2	59 3.2	1.06	15 37.0	57 12.4	1.63	15 3.4	55 9.0	1.23
16.0	16 3.6	58 50.1	1.12	15 31.8	56 53.2	1.57	14 59.6	54 55.0	1.09
16.5	15 59.9	58 36.4	1.16	15 26.8	56 34.9	1.49	14 56.3	54 42.7	0.96
17.0	15 56.1	58 22.2	1.20	15 22.1	56 17.4	1.41	14 53.4	54 32.0	0.83
17.5	15 52.1	58 7.7	1.23	15 17.6	56 1.0	1.33	14 50.9	54 22.8	0.70
18.0	15 48.1	57 52.8	1.24	15 13.4	55 45.5	1.25	14 48.8	54 15.1	0.58
18.5	15 44.0	57 37.8	1.25	15 9.4	55 30.9	1.17	14 47.1	54 8.8	0.46
19.0	15 39.9	57 22.7	1.25	15 5.7	55 17.4	1.09	14 45.8	54 3.9	0.35
19.5	15 35.7	57 7.6	1.26	15 2.3	55 4.8	1.01	14 44.8	54 0.4	0.24
20.0	15 31.6	56 52.5	1.26	14 59.1	54 53.2	0.92	14 44.1	53 58.1	0.13
20.5	15 27.5	56 37.4	1.26	14 56.3	54 42.7	0.84	14 43.9	53 57.1	-0.02
21.0	15 23.4	56 22.4	1.25	14 53.7	54 33.1	0.75	14 44.0	53 57.4	+0.08
21.5	15 19.4	56 7.5	1.23	14 51.4	54 24.7	0.66	14 44.4	53 59.1	0.20
22.0	15 15.4	55 52.9	1.20	14 49.4	54 17.4	0.57	14 45.2	54 2.1	0.31
22.5	15 11.5	55 38.7	1.17	14 47.7	54 11.2	0.47	14 46.4	54 6.7	0.44
23.0	15 7.8	55 24.9	1.12	14 46.4	54 6.3	0.36	14 48.1	54 12.7	0.57
23.5	15 4.2	55 11.8	1.07	14 45.4	54 2.7	0.24	14 50.2	54 20.4	0.71
24.0	15 0.8	54 59.4	1.01	14 44.8	54 0.6	-0.11	14 52.8	54 29.7	0.85
24.5	14 57.7	54 47.9	0.92	14 44.7	54 0.1	+0.02	14 55.8	54 40.9	1.00
25.0	14 54.9	54 37.4	0.82	14 45.0	54 1.4	0.17	14 59.3	54 53.8	1.16
25.5	14 52.4	54 28.2	0.71	14 45.9	54 4.5	0.34	15 3.4	55 8.7	1.32
26.0	14 50.3	54 20.5	0.58	14 47.3	54 9.6	0.51	15 7.9	55 25.5	1.48
26.5	14 48.6	54 14.4	0.44	14 49.3	54 16.9	0.69	15 13.0	55 44.2	1.63
27.0	14 47.4	54 10.1	0.28	14 51.8	54 26.3	0.87	15 18.6	56 4.7	1.79
27.5	14 46.8	54 7.8	-0.11	14 55.0	54 38.0	1.06	15 24.7	56 27.0	1.93
28.0	14 46.7	54 7.6	+0.07	14 58.8	54 51.9	1.25	15 31.3	56 51.0	2.06
28.5	14 47.3	54 9.7	0.26	15 3.2	55 8.2	1.45	15 38.2	57 16.5	2.18
29.0	14 48.5	54 14.1	0.46	15 8.3	55 26.8	1.64	15 45.4	57 43.1	2.26
29.5	14 50.4	54 21.0	0.67	15 14.0	55 47.6	1.82	15 52.9	58 10.6	2.31
30.0	14 52.9	54 30.4	0.88	15 20.2	56 10.5	1.98	16 0.5	58 38.4	2.32
30.5	14 56.2	54 42.2	1.09	15 26.9	56 35.2	2.13	16 8.0	59 6.1	+2.29
31.0	15 0.1	54 56.6	1.29	15 34.1	57 1.5	2.25	$\Delta s = 273 \Delta \pi$		
31.5	15 4.6	55 13.3	+1.49	15 41.6	57 29.1	+2.35			

FOR WASHINGTON MEAN NOON AND MIDNIGHT.									
Date.	OCTOBER.			NOVEMBER.			DECEMBER.		
	Semi-diameter.	Horizontal Parallax.	Hourly Diff.	Semi-diameter.	Horizontal Parallax.	Hourly Diff.	Semi-diameter.	Horizontal Parallax.	Hourly Diff.
d									
1.0	16 15.3	59 33.0	+2.20	16 36.3	60 50.1	+0.73	16 24.0	60 4.7	-0.45
1.5	16 22.3	59 58.5	2.05	16 38.1	60 56.7	0.38	16 22.0	59 57.5	0.73
2.0	16 28.7	60 21.9	1.84	16 38.8	60 59.1	+0.01	16 19.1	59 47.1	1.01
2.5	16 34.3	60 42.4	1.58	16 38.2	60 56.9	-0.36	16 15.4	59 33.4	1.26
3.0	16 38.9	60 59.5	1.26	16 36.4	60 50.3	0.73	16 10.9	59 16.9	1.49
3.5	16 42.4	61 12.4	0.89	16 33.4	60 39.3	1.09	16 5.8	58 57.8	1.69
4.0	16 44.7	61 20.7	0.49	16 29.3	60 24.3	1.42	16 0.0	58 36.5	1.85
4.5	16 45.6	61 24.1	+0.07	16 24.2	60 5.4	1.71	15 53.7	58 13.6	1.97
5.0	16 45.1	61 22.5	-0.35	16 18.2	59 43.4	1.95	15 47.1	57 49.5	2.04
5.5	16 43.3	61 15.8	0.76	16 11.5	59 18.9	2.14	15 40.4	57 24.9	2.07
6.0	16 40.2	61 4.2	1.15	16 4.3	58 52.5	2.27	15 33.7	57 0.2	2.05
6.5	16 35.8	60 48.2	1.51	15 56.8	58 24.7	2.34	15 27.1	56 35.9	1.99
7.0	16 30.4	60 28.4	1.81	15 49.1	57 56.5	2.36	15 20.8	56 12.6	1.90
7.5	16 24.1	60 5.2	2.05	15 41.4	57 28.3	2.33	15 14.8	55 50.6	1.78
8.0	16 17.1	59 39.4	2.24	15 33.9	57 0.8	2.26	15 9.2	55 30.2	1.63
8.5	16 9.6	59 11.8	2.36	15 26.7	56 34.4	2.15	15 4.2	55 11.7	1.45
9.0	16 1.8	58 43.1	2.42	15 19.9	56 9.5	2.01	14 59.8	54 55.5	1.25
9.5	15 53.9	58 14.1	2.43	15 13.7	55 46.5	1.84	14 56.0	54 41.7	1.05
10.0	15 46.0	57 45.2	2.39	15 8.0	55 25.6	1.65	14 52.9	54 30.4	0.83
10.5	15 38.3	57 17.1	2.31	15 2.9	55 7.0	1.45	14 50.6	54 21.7	0.62
11.0	15 31.0	56 50.2	2.19	14 58.5	54 50.8	1.25	14 49.0	54 15.6	0.40
11.5	15 24.1	56 24.7	2.05	14 54.7	54 37.0	1.04	14 48.0	54 12.1	-0.18
12.0	15 17.7	56 1.1	1.89	14 51.7	54 25.8	0.83	14 47.7	54 11.3	+0.03
12.5	15 11.8	55 39.6	1.71	14 49.3	54 16.9	0.62	14 48.2	54 12.9	0.24
13.0	15 6.5	55 20.1	1.53	14 47.6	54 10.7	0.43	14 49.3	54 17.0	0.44
13.5	15 1.8	55 2.8	1.35	14 46.5	54 6.7	0.24	14 51.0	54 23.4	0.62
14.0	14 57.6	54 47.6	1.17	14 46.0	54 5.0	-0.05	14 53.3	54 31.8	0.79
14.5	14 54.1	54 34.7	0.99	14 46.1	54 5.4	+0.12	14 56.1	54 42.2	0.94
15.0	14 51.2	54 23.9	0.81	14 46.8	54 7.7	0.28	14 59.4	54 54.2	1.07
15.5	14 48.8	54 15.1	0.65	14 47.9	54 11.9	0.42	15 3.1	55 7.7	1.18
16.0	14 46.9	54 8.3	0.49	14 49.5	54 17.8	0.55	15 7.1	55 22.5	1.27
16.5	14 45.6	54 3.5	0.33	14 51.5	54 25.1	0.67	15 11.4	55 38.1	1.34
17.0	14 44.8	54 0.4	0.18	14 53.8	54 33.7	0.77	15 15.8	55 54.4	1.38
17.5	14 44.4	53 59.1	-0.05	14 56.5	54 43.5	0.86	15 20.3	56 11.0	1.40
18.0	14 44.5	53 59.3	+0.08	14 59.4	54 54.3	0.93	15 24.9	56 27.7	1.39
18.5	14 44.9	54 0.9	0.19	15 2.6	55 5.9	1.00	15 29.4	56 44.3	1.37
19.0	14 45.7	54 3.9	0.30	15 6.0	55 18.2	1.05	15 33.8	57 0.5	1.33
19.5	14 46.9	54 8.2	0.41	15 9.5	55 31.1	1.10	15 38.1	57 16.1	1.28
20.0	14 48.4	54 13.6	0.51	15 13.1	55 44.5	1.14	15 42.1	57 31.0	1.21
20.5	14 50.2	54 20.2	0.60	15 16.8	55 58.3	1.17	15 46.0	57 45.1	1.14
21.0	14 52.3	54 28.0	0.70	15 20.7	56 12.5	1.20	15 49.5	57 58.2	1.06
21.5	14 54.7	54 37.0	0.79	15 24.7	56 27.0	1.22	15 52.8	58 10.4	0.97
22.0	14 57.5	54 47.0	0.88	15 28.8	56 41.9	1.25	15 55.8	58 21.6	0.89
22.5	15 0.5	54 58.2	0.98	15 32.9	56 57.1	1.27	15 58.6	58 31.7	0.80
23.0	15 3.9	55 10.6	1.08	15 37.1	57 12.5	1.29	16 1.1	58 40.9	0.72
23.5	15 7.6	55 24.1	1.18	15 41.3	57 28.1	1.31	16 3.3	58 49.0	0.64
24.0	15 11.6	55 39.0	1.29	15 45.6	57 44.0	1.33	16 5.3	58 56.2	0.56
24.5	15 16.0	55 55.1	1.39	15 50.0	58 0.0	1.33	16 7.0	59 2.5	0.48
25.0	15 20.7	56 12.4	1.49	15 54.4	58 16.0	1.33	16 8.4	59 7.8	0.40
25.5	15 25.8	56 30.9	1.59	15 58.7	58 32.0	1.32	16 9.6	59 12.1	0.32
26.0	15 31.1	56 50.7	1.69	16 3.0	58 47.7	1.29	16 10.5	59 15.4	0.23
26.5	15 36.8	57 11.5	1.78	16 7.2	59 2.9	1.24	16 11.1	59 17.5	0.13
27.0	15 42.7	57 33.3	1.85	16 11.1	59 17.3	1.17	16 11.3	59 18.3	+0.02
27.5	15 48.9	57 55.9	1.91	16 14.7	59 30.8	1.07	16 11.2	59 17.8	-0.10
28.0	15 55.2	58 19.0	1.94	16 18.0	59 42.8	0.93	16 10.6	59 15.8	0.24
28.5	16 1.5	58 42.3	1.94	16 20.8	59 52.9	0.76	16 9.6	59 12.1	0.38
29.0	16 7.8	59 5.4	1.90	16 22.9	60 0.9	0.57	16 8.1	59 6.5	0.54
29.5	16 13.9	59 27.8	1.83	16 24.4	60 6.4	0.34	16 6.1	58 59.1	0.70
30.0	16 19.7	59 49.0	1.71	16 25.1	60 9.0	+0.09	16 3.6	58 49.8	0.86
30.5	16 25.0	60 8.4	1.53	16 25.0	60 8.5	-0.18	16 0.5	58 38.6	1.01
31.0	16 29.6	60 25.4	1.31	$\Delta s = .273 \Delta \pi$			15 56.9	58 25.5	1.16
31.5	16 33.4	60 39.5	+1.04				15 52.9	58 10.6	-1.31



## WASHINGTON MEAN TIME.

## PHASES.

Month.	Last Quarter.	New Moon.	First Quarter.	Full Moon.	Last Quarter.
	d h m	d h m	d h m	d h m	
January	4 13 14.5	12 1 44.8	20 7 18.1	27 8 22.2	
February	2 23 47.9	10 20 45.7	18 23 57.9	25 18 56.4	
March	4 12 35.1	12 15 38.4	20 12 45.8	27 4 24.5	
April	3 3 40.0	11 8 39.4	18 21 57.6	25 13 13.3	
May	2 20 32.6	10 22 59.0	18 4 20.8	24 22 15.2	
June	1 14 13.3	9 10 43.8	16 9 7.1	23 8 30.7	
July	1 7 37.9	8 20 29.5	15 13 39.7	22 20 46.4	d h m
August		7 4 59.7	13 19 32.6	21 11 15.4	30 23 58.3
September		5 12 58.3	12 4 15.3	20 3 32.7	29 14 50.1
October		4 21 11.2	11 16 54.3	19 20 49.2	28 4 1.7
November		3 6 27.3	10 9 47.2	18 14 9.7	27 15 26.4
December		2 17 33.2	10 6 3.3	18 6 41.8	26 1 6.4
					25 9 25.8

## APOGEE, PERIGEE, AND GREATEST LIBRATION.

Month.	Apogee.	Perigee.	Apogee.	GREATEST LIBRATION.		
	d h	d h		d h m	d h m	
January	16 0.8	28 8.1		7 3 26 N.W.	22 11 54 N.E.	
February	12 11.2	25 20.3		3 17 18 N.W.	19 19 31 N.E.	
March	11 11.6	26 7.7		3 22 10 N.W.	19 23 47 N.E.	
April	7 20.1	23 14.3		1 5 24 N.W.	16 15 23 N.E.	d h m
May	5 12.5	21 4.5			13 5 23 N.E.	29 9 8 N.W.
June	2 6.8	15 16.7	d h		8 17 52 N.E.	27 4 28 N.W.
July		11 23.9	30 1.2		6 2 37 N.E.	23 8 3 N.W.
August		8 20.2	27 18.9		15 13 50 N.W.	19 16 57 N.W.
September		6 3.3	24 9.9	3 0 35 N.E.	12 9 22 N.W.	31 4 39 N.E.
October		4 14.2	20 15.1		10 13 44 N.W.	28 10 31 N.E.
November		2 0.4	17 16.5		7 19 47 S.W.	26 11 58 S.E.
November		30 4.1	14 3.7			22 17 57 S.E.
December	11 22.1	27 1.7			5 21 53 S.W.	18 20 42 N.E.

## MOON'S EQUATOR.

The moon's libration in latitude and longitude, at any time, may be found by means of the following formulas and tables:

$I$  = the inclination to the ecliptic of the moon's equator =  $1^{\circ} 28'.8$ .

$\Omega$  = mean longitude of the moon's ascending node (see page 250).

= mean longitude of the descending node of the moon's equator.

$C$  = the angle at the centre of the moon's disc made by a meridian of the moon with the circle of declination, reckoned from north to east on the apparent disc.

$i$ ,  $\Delta$ ,  $\Omega'$ , and  $\zeta$  are defined on the next page, where their values for the year are given.

$\lambda$ ,  $\beta$ ,  $a'$ , and  $\delta'$  the apparent longitude, latitude, right ascension, and declination of the moon affected with parallax.

$\lambda'$  = the selenocentric longitude of the earth, reckoned on the moon's equator from its descending node.

$$\left. \begin{aligned} \Delta \lambda &= -0'.57 \sin 2(\Omega - \lambda) \\ a &= \sin I \cos(\Omega - \lambda) \\ \tan B &= \tan I \sin(\Omega - \lambda) \\ \lambda' &= \lambda + \Delta \lambda + a b \end{aligned} \right\} \text{See table, VII of the Appendix.}$$

The libration in latitude,  $b = B - \beta$ ,  
 " " longitude,  $l = \lambda' - \zeta$ .

$$\sin C = \sin i \frac{\cos(\lambda' + \Delta - \Omega)}{\cos \delta'} = -\sin i \frac{\cos(a' - \Omega')}{\cos b}.$$

## WASHINGTON MEAN TIME.

Mean Noon.	MOON'S EQUATOR.			Moon's Mean Longitude.	Mean Solar Days.	Motion of (
	$i$ Inclination to the Earth's Equator.	$\Delta$ Ascending Node on Earth's Equator to Ascending Node on Ecliptic.	$\Omega'$ Ascending Node on Earth's Equator.			
Jan. 0	24° 35.3	320° 51.7	357° 39.3	130° 5.6	0.1	1° 19.06
10	24 34.8	320 21.3	357 37.8	261 51.5	0.2	2 38.12
20	24 34.2	319 50.9	357 36.3	33 37.3	0.3	3 57.18
30	24 33.7	319 20.6	357 34.8	165 23.2	0.4	5 16.23
Feb. 9	24 33.1	318 50.2	357 33.3	297 9.0	0.5	6 35.29
19	24 32.6	318 19.8	357 31.8	68 54.8	0.6	7 54.35
March 1	24 32.0	317 49.4	357 30.4	200 40.7	0.7	9 13.41
11	24 31.5	317 18.9	357 28.9	332 26.5	0.8	10 32.47
21	24 30.9	316 48.5	357 27.5	104 12.4	0.9	11 51.53
31	24 30.4	316 18.0	357 26.0	235 58.2		
April 10	24 29.8	315 47.6	357 24.6	7 44.0	1.0	13 10.58
20	24 29.2	315 17.1	357 23.2	139 29.9	2.0	26 21.17
30	24 28.6	314 46.6	357 21.8	271 15.7	3.0	39 31.75
May 10	24 28.1	314 16.0	357 20.4	43 1.6	4.0	52 42.33
20	24 27.5	313 45.5	357 19.0	174 47.4	5.0	65 52.92
30	24 26.9	313 15.0	357 17.6	306 33.2	6.0	79 3.50
June 9	24 26.3	312 44.4	357 16.3	78 19.1	7.0	92 14.09
19	24 25.7	312 13.9	357 14.9	210 4.9	8.0	105 24.67
29	24 25.1	311 43.3	357 13.6	341 50.8	9.0	118 35.25
July 9	24 24.5	311 12.8	357 12.2	113 36.6	10.0	131 45.84
19	24 23.9	310 42.2	357 10.9	245 22.4	<sup>h</sup> 1	0 32.94
29	24 23.3	310 11.6	357 9.6	17 8.3	2	1 5.88
Aug. 8	24 22.6	309 41.0	357 8.4	148 54.1	3	1 38.82
18	24 22.0	309 10.3	357 7.1	280 40.0	4	2 11.76
28	24 21.3	308 39.7	357 5.9	52 25.8	5	2 44.70
Sept. 7	24 20.7	308 9.1	357 4.6	184 11.6	6	3 17.64
17	24 20.0	307 38.4	357 3.4	315 57.5	7	3 50.59
27	24 19.4	307 7.8	357 2.2	87 43.3	8	4 23.53
Oct. 7	24 19.7	306 37.1	357 1.0	219 29.2	9	4 56.47
17	24 18.1	306 6.5	356 59.8	351 15.0	10	5 29.41
27	24 17.4	305 35.8	356 58.6	123 0.8	11	6 2.35
Nov. 6	24 16.7	305 5.1	356 57.5	254 46.7	12	6 35.29
16	24 16.0	304 34.4	356 56.4	26 32.5	13	7 8.23
26	24 15.4	304 3.6	356 55.2	158 18.4	14	7 41.17
Dec. 6	24 14.7	303 32.9	356 54.1	290 4.2	15	8 14.11
16	24 14.0	303 2.2	356 53.0	61 50.0	16	8 47.05
26	24 13.3	302 31.4	356 51.9	193 35.9	17	9 19.99
36	24 12.6	302 0.6	356 50.7	325 21.7	18	9 52.93

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
Jan. 1	18 45 55.05	45 55.16	24 46 58.0	46 58.0	+9.47040	+9.2127	+3.42	+5.33	1 0 0.4
2	18 53 0.93	53 1.98	24 42 18.8	42 18.0	9.47144	9.3517	3.36	5.33	2 0 3.5
3	19 0 7.76	0 9.75	24 36 10.4	36 8.5	9.47233	9.4579	3.29	5.34	3 0 6.7
4	19 7 15.40	7 18.35	24 28 31.9	28 28.4	9.47309	9.5440	3.21	5.34	4 0 9.9
5	19 14 23.72	14 27.62	24 19 22.3	19 16.9	9.47370	9.6165	3.11	5.35	5 0 13.1
6	19 21 32.57	21 37.43	24 8 40.7	8 32.9	9.47416	9.6791	2.94	5.35	6 0 16.3
7	19 28 41.78	28 47.60	23 56 26.4	56 15.8	9.47445	9.7342	2.70	5.35	7 0 19.5
8	19 35 51.20	35 57.99	23 42 38.8	42 25.0	9.47457	9.7834	+1.68	5.36	8 0 22.8
9	19 43 0.64	43 8.39	23 27 17.2	26 59.7	9.47448	9.8279	-2.68	5.36	9 0 26.0
10	19 50 9.88	50 18.59	23 10 21.0	9 59.4	9.47418	9.8684	2.98	5.36	10 0 29.2
11	19 57 18.72	57 28.37	22 51 49.9	51 23.8	9.47367	9.9056	3.17	5.36	11 0 32.4
12	20 4 26.94	4 37.52	22 31 43.8	31 12.8	9.47290	9.9399	3.34	5.36	12 0 35.6
13	20 11 34.26	11 45.76	22 10 2.6	9 26.3	9.47184	9.9716	3.45	5.36	13 0 38.8
14	20 18 40.40	18 52.80	21 46 46.4	46 4.3	9.47049	0.0010	3.56	5.36	14 0 42.0
15	20 25 45.05	25 58.32	21 21 55.9	21 7.7	9.46879	0.0284	3.65	5.35	15 0 45.1
16	20 32 47.85	33 1.98	20 55 31.7	54 37.0	9.46671	0.0540	3.73	5.35	16 0 48.2
17	20 39 48.41	40 3.35	20 27 34.8	26 33.3	9.46418	0.0779	3.81	5.34	17 0 51.3
18	20 46 46.28	47 1.98	19 58 6.8	56 58.3	9.46113	0.1000	3.89	5.33	18 0 54.3
19	20 53 40.96	53 57.39	19 27 9.8	25 54.1	9.45748	0.1206	3.96	5.32	19 0 57.3
20	21 0 31.86	0 48.96	18 54 46.2	53 23.1	9.45315	0.1396	4.03	5.30	20 1 0.2
21	21 7 18.33	7 36.02	18 20 59.5	19 28.9	9.44806	0.1570	4.10	5.28	21 1 3.1
22	21 13 59.64	14 17.83	17 45 53.6	44 15.6	9.44203	0.1729	4.16	5.25	22 1 5.8
23	21 20 34.93	20 53.55	17 9 33.5	7 48.1	9.43489	0.1870	4.23	5.22	23 1 8.4
24	21 27 3.21	27 22.14	16 32 5.3	30 12.9	9.42647	0.1996	4.29	5.17	24 1 10.9
25	21 33 23.39	33 42.52	15 53 36.2	51 37.1	9.41653	0.2102	4.35	5.10	25 1 13.3
26	21 39 34.22	39 53.39	15 14 15.0	12 9.8	9.40478	0.2189	4.42	5.00	26 1 15.6
27	21 45 34.28	45 53.36	14 34 11.9	32 1.5	9.39085	0.2254	4.48	4.86	27 1 17.6
28	21 51 21.96	51 40.75	13 53 38.8	51 24.0	9.37431	0.2296	4.53	4.59	28 1 19.4
29	21 56 55.50	57 13.82	13 12 49.5	10 31.5	9.35467	0.2312	4.59	+3.16	29 1 21.1
30	22 2 12.96	2 30.60	12 31 59.6	29 39.7	9.33121	0.2298	4.64	-4.62	30 1 22.4
31	22 7 12.19	7 28.93	11 51 26.9	49 6.8	9.30308	0.2250	4.70	4.95	31 1 23.4
Feb. 1	22 11 50.89	12 6.48	11 11 31.3	9 12.9	9.26919	0.2164	4.74	5.15	1 1 24.1
2	22 16 6.64	16 20.88	10 32 34.4	30 19.6	9.22802	0.2034	4.79	5.30	2 1 24.4
3	22 19 56.91	20 9.55	9 54 50.7	52 50.9	9.17745	0.1851	4.83	5.41	3 1 24.3
4	22 23 19.14	23 29.98	9 19 12.1	17 11.1	9.11432	0.1608	4.87	5.51	4 1 23.7
5	22 26 10.82	26 19.67	8 45 37.5	43 46.7	9.03361	0.1292	4.90	5.58	5 1 22.6
6	22 28 29.55	28 36.32	8 14 42.3	13 3.3	8.92624	0.0888	4.93	5.65	6 1 20.9
7	22 30 13.17	30 17.78	7 46 52.8	45 27.4	8.77327	0.0370	4.95	5.71	7 1 18.7
8	22 31 19.96	31 22.35	7 22 34.0	21 23.5	8.52093	0.9706	4.96	5.75	8 1 15.8
9	22 31 48.42	31 48.83	7 2 9.1	1 13.9	+7.80145	9.8853	4.97	5.79	9 1 12.3
10	22 31 38.04	31 36.58	6 45 58.6	45 19.2	-8.31695	9.7646	4.97	5.81	10 1 8.2
11	22 30 48.83	30 45.79	6 34 18.7	33 54.2	8.67693	9.5901	4.96	5.83	11 1 3.4
12	22 29 21.69	29 17.41	6 27 20.6	27 9.7	8.86515	+9.2811	4.94	5.84	12 0 58.0
13	22 27 18.49	27 13.40	6 25 9.2	25 9.8	8.98887	-7.9244	4.91	5.84	13 0 52.0
14	22 24 42.09	24 36.65	6 27 43.0	27 52.4	9.07665	9.3099	4.85	5.82	14 0 45.5
15	22 21 36.32	21 30.98	6 34 52.8	35 8.0	9.14037	9.5920	4.77	5.80	15 0 38.6
16	22 18 5.90	18 1.14	6 46 21.9	46 39.5	9.18593	9.7508	4.66	5.75	16 0 31.0
17	22 14 16.33	14 12.49	7 1 46.4	2 3.1	9.21670	9.8556	4.50	5.70	17 0 23.3
18	22 10 13.60	10 10.96	7 20 36.3	20 49.3	9.23476	9.9285	4.22	5.61	18 0 15.4
19	22 6 4.01	6 2.74	7 42 16.8	42 23.8	9.24113	9.9793	-3.13	5.50	19 0 7.3
20	22 1 53.86	1 53.99	8 6 9.9	6 9.1	9.23677	0.0138	+4.12	5.35	19 23 59.2
21	21 57 49.15	57 50.61	8 31 36.6	31 27.1	9.22199	0.0350	4.42	5.13	20 23 51.3
22	21 53 55.42	53 58.62	8 57 58.8	57 40.5	9.19686	0.0451	4.58	-4.67	21 23 43.5
23	21 50 17.46	50 20.95	9 24 40.4	24 13.6	9.16108	0.0457	4.68	+4.50	22 23 35.9
24	21 46 59.28	47 3.36	9 51 8.9	50 34.7	9.11394	0.0381	4.74	5.00	23 23 28.7
25	21 44 3.97	44 8.30	10 16 56.3	16 16.1	9.05395	0.0231	4.78	5.19	24 23 21.9
26	21 41 33.82	41 38.07	10 41 39.1	40 54.4	8.97838	0.0011	4.81	5.30	25 23 15.4
27	21 39 30.34	39 34.20	11 4 58.4	4 10.8	8.88242	9.9727	4.82	5.38	26 23 9.5
28	21 37 54.28	37 57.49	11 26 39.4	25 50.7	8.75684	9.9379	4.82	5.42	27 23 3.9
29	21 36 45.81	36 48.17	11 46 31.5	45 43.2	8.57994	9.8965	4.82	5.45	28 22 58.8
30	21 36 4.64	36 5.93	12 4 27.0	3 40.5	8.28452	9.8483	4.81	5.47	29 22 54.2
31	21 35 50.08	35 50.18	-12 20 21.2	19 37.7	-7.03476	-9.7922	+4.79	+5.48	30 22 50.0

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
Mar. 1	h m s	m s	° ' "	' "					d h m
1	21 36 45.81	36 48.17	-11 46' 31.5	45 43.2	-8.57994	-9.8965	+4.82	+5.45	0 22 58.8
2	21 36 46.4	36 5.93	12 4 27.0	3 40.5	8.28452	9.8483	4.81	5.47	1 22 54.2
3	21 35 50.08	35 50.18	12 20 21.2	19 37.7	-7.03476	9.7922	4.79	5.48	2 22 50.0
4	21 36 1.17	36 0.00	12 34 11.2	33 31.7	+8.21363	9.7267	4.77	5.48	3 22 46.2
5	21 36 36.77	36 34.26	12 45 56.0	45 21.4	8.51756	9.6494	4.75	5.48	4 22 42.8
6	21 37 35.56	37 31.70	12 55 35.9	55 6.9	8.68646	9.5557	4.72	5.48	5 22 39.9
7	21 38 56.23	38 51.03	13 3 11.8	2 48.9	8.80155	9.4376	4.69	5.47	6 22 37.3
8	21 40 37.41	40 30.90	13 8 45.4	8 29.1	8.88688	9.2782	4.66	5.46	7 22 35.0
9	21 42 37.74	42 29.95	13 12 19.1	12 9.6	8.95379	9.0306	4.63	5.45	8 22 33.0
10	21 44 55.91	44 46.91	13 13 55.2	13 52.7	9.00797	-8.4237	4.60	5.44	9 22 31.4
11	21 47 30.66	47 20.53	13 13 36.4	13 40.9	9.05283	+8.7193	4.57	5.43	10 22 30.0
12	21 50 20.77	50 9.57	13 11 25.2	11 36.8	9.09061	9.1122	4.54	5.42	11 22 28.9
13	21 53 25.12	53 12.93	13 7 24.4	7 43.0	9.12294	9.3111	4.50	5.41	12 22 28.0
14	21 56 42.67	56 29.58	13 1 36.5	2 2.1	9.15087	9.4443	4.47	5.40	13 22 27.3
15	21 60 12.44	59 58.52	12 54 4.1	54 36.5	9.17523	9.5439	4.44	5.39	14 22 26.9
16	22 3 53.52	3 38.85	12 44 49.8	45 28.8	9.19662	9.6231	4.40	5.38	15 22 26.6
17	22 7 45.08	7 29.74	12 33 55.8	34 41.2	9.21553	9.6886	4.37	5.37	16 22 26.5
18	22 11 46.35	11 30.42	12 21 24.4	22 16.1	9.23239	9.7444	4.34	5.36	17 22 26.6
19	22 15 56.65	15 40.19	12 7 17.7	8 15.3	9.24750	9.7928	4.31	5.35	18 22 26.8
20	22 20 15.35	19 58.44	11 51 37.8	52 41.1	9.26112	9.8354	4.28	5.34	19 22 27.2
21	22 24 41.89	24 24.57	11 34 26.7	35 35.5	9.27345	9.8734	4.25	5.33	20 22 27.7
22	22 29 15.74	28 58.08	11 15 46.2	17 0.2	9.28467	9.9079	4.22	5.32	21 22 28.3
23	22 33 56.45	33 38.51	10 55 38.0	56 56.9	9.29496	9.9390	4.19	5.32	22 22 29.0
24	22 38 43.61	38 25.44	10 34 3.8	35 27.3	9.30443	9.9676	4.17	5.31	23 22 29.8
25	22 43 36.86	43 18.51	10 11 5.2	12 33.0	9.31320	9.9940	4.14	5.30	24 22 30.8
26	22 48 35.87	48 17.39	9 46 43.9	48 15.7	9.32135	0.0184	4.12	5.29	25 22 31.8
27	22 53 40.36	53 21.79	9 21 1.2	22 36.8	9.32898	0.0411	4.10	5.28	26 22 32.9
28	22 58 50.09	58 31.48	8 53 58.6	55 37.6	9.33618	0.0622	4.08	5.28	27 22 34.2
29	23 4 4.85	3 46.24	8 25 37.4	27 19.5	9.34299	0.0822	4.07	5.27	28 22 35.5
30	23 9 24.47	9 5.88	7 55 59.0	57 43.9	9.34949	0.1009	4.06	5.26	29 22 36.8
31	23 14 48.80	14 30.27	7 25 4.6	26 51.9	9.35572	0.1186	4.05	5.26	30 22 38.3
Apr. 1	23 20 17.74	19 59.31	6 52 55.6	54 44.9	9.36175	0.1352	4.04	5.25	0 22 39.8
2	23 25 51.21	25 32.91	6 19 33.2	21 24.3	9.36758	0.1510	4.03	5.24	1 22 41.4
3	23 31 29.13	31 10.98	5 44 58.8	46 51.3	9.37328	0.1659	4.03	5.23	2 22 43.1
4	23 37 11.47	36 53.51	5 9 13.6	11 7.2	9.37891	0.1801	4.03	5.23	3 22 44.9
5	23 42 58.27	42 40.53	4 32 18.8	34 13.1	9.38451	0.1936	4.03	5.22	4 22 46.8
6	23 48 49.54	48 32.03	3 54 15.6	56 10.3	9.39004	0.2066	4.03	5.21	5 22 48.7
7	23 54 45.30	54 28.07	3 15 5.5	17 0.2	9.39554	0.2188	4.04	5.20	6 22 50.6
8	0 0 45.60	0 28.65	2 34 49.8	36 44.2	9.40108	0.2304	4.05	5.19	7 22 52.7
9	0 6 50.55	6 33.93	1 53 30.0	55 23.6	9.40668	0.2416	4.06	5.18	8 22 54.8
10	0 13 0.27	12 44.00	1 11 7.5	12 59.9	9.41234	0.2521	4.07	5.17	9 22 57.1
11	0 19 14.87	18 58.98	-0 27 44.0	29 34.8	9.41810	0.2622	4.08	5.16	10 22 59.4
12	0 25 34.52	25 19.06	+0 16 38.8	14 50.0	9.42396	0.2717	4.10	5.14	11 23 1.7
13	0 31 59.38	31 44.37	1 1 59.1	0 12.6	9.42994	0.2808	4.11	5.12	12 23 4.2
14	0 38 29.63	38 15.11	1 48 14.6	46 31.0	9.43604	0.2892	4.13	5.10	13 23 6.8
15	0 45 5.46	44 51.46	2 35 23.1	33 42.9	9.44227	0.2970	4.14	5.08	14 23 9.4
16	0 51 47.07	51 33.64	3 23 22.0	21 45.6	9.44863	0.3045	4.16	5.06	15 23 12.2
17	0 58 34.67	58 21.85	4 12 8.3	10 36.2	9.45513	0.3114	4.18	5.03	16 23 15.0
18	1 5 28.49	5 16.33	5 1 38.9	0 11.6	9.46178	0.3175	4.19	4.99	17 23 18.0
19	1 12 28.74	12 17.28	5 51 50.0	50 28.1	9.46852	0.3231	4.20	4.94	18 23 21.1
20	1 19 35.61	19 24.92	6 42 37.4	41 21.3	9.47535	0.3280	4.21	4.88	19 23 24.2
21	1 26 49.28	26 39.42	7 33 56.3	32 46.6	9.48225	0.3320	4.23	4.80	20 23 27.5
22	1 34 9.93	34 0.97	8 25 41.3	24 38.4	9.48920	0.3352	4.23	4.68	21 23 30.9
23	1 41 37.68	41 29.68	9 17 46.4	16 50.9	9.49613	0.3376	4.24	4.50	22 23 34.5
24	1 49 12.50	49 5.62	10 10 4.7	9 16.9	9.50298	0.3389	4.24	+4.11	23 23 38.1
25	1 56 54.69	56 48.83	11 2 28.4	1 48.8	9.50973	0.3301	4.24	-3.87	24 23 41.9
26	2 4 43.92	4 39.24	11 54 49.0	54 18.0	9.51627	0.3380	4.23	4.48	25 23 45.8
27	2 12 40.12	12 36.71	12 46 57.0	46 34.8	9.52252	0.3356	4.21	4.74	26 23 49.8
28	2 20 43.02	20 40.95	13 38 42.3	38 29.2	9.52841	0.3316	4.18	4.91	27 23 53.9
29	2 28 52.27	28 51.62	14 29 53.6	29 49.6	9.53385	0.3260	4.15	5.04	28 23 58.1
30	2 37 7.38	38 8.22	15 20 19.5	20 24.6	9.53873	0.3187	4.10	5.14	30 0 2.4
31	2 45 27.72	45 30.10	+16 9 47.4	10 1.3	+9.54296	+0.3092	+4.03	-5.23	31 0 6.8

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
May 1	2 45 27.72	45 30.10	+16 9 47.4	10 1.3	+9.54296	+0.3092	+4.03	-5.23	1 0 6.8
2	2 53 52.53	53 56.52	16 58 5.2	58 27.7	9.54644	0.2978	3.93	5.30	2 0 11.3
3	3 2 20.92	2 26.54	17 45 0.1	45 30.6	9.54909	0.2840	3.80	5.36	3 0 15.9
4	3 10 51.91	10 59.18	18 30 19.9	30 57.8	9.55085	0.2678	3.56	5.41	4 0 20.5
5	3 19 24.40	19 33.33	19 13 52.9	14 37.4	9.55163	0.2491	+2.90	5.45	5 0 25.1
6	3 27 57.21	28 7.78	19 55 28.1	56 15.3	9.55138	0.2277	-3.33	5.49	6 0 29.7
7	3 36 29.12	36 41.29	20 34 55.9	35 50.7	9.55009	0.2036	3.71	5.52	7 0 34.3
8	3 44 58.87	45 12.58	21 12 7.9	13 6.2	9.54772	0.1764	3.91	5.54	8 0 38.9
9	3 53 25.22	53 40.41	21 46 57.2	47 57.9	9.54427	0.1461	4.05	5.55	9 0 43.4
10	4 1 46.93	2 3.49	22 19 18.5	20 20.4	9.53974	0.1125	4.14	5.56	10 0 47.8
11	4 10 2.84	10 20.67	22 49 7.9	50 9.9	9.53415	0.0752	4.22	5.57	11 0 52.1
12	4 18 11.82	18 30.80	23 16 23.4	17 24.4	9.52754	0.0343	4.28	5.57	12 0 56.3
13	4 26 12.85	26 32.85	23 41 4.6	42 3.5	9.51991	9.9890	4.33	5.57	13 1 0.4
14	4 34 4.94	34 25.83	24 3 11.7	4 7.6	9.51125	9.9387	4.37	5.56	14 1 4.4
15	4 41 47.20	42 8.83	24 22 46.5	23 38.5	9.50162	9.8829	4.41	5.55	15 1 8.2
16	4 49 18.83	49 41.04	24 39 52.1	40 39.5	9.49104	9.8204	4.44	5.54	16 1 11.7
17	4 56 39.10	57 1.76	24 54 32.1	55 14.3	9.47949	9.7492	4.46	5.53	17 1 15.1
18	5 3 47.34	4 10.28	25 6 50.7	7 27.1	9.46605	9.6674	4.48	5.52	18 1 18.3
19	5 10 42.93	11 6.02	25 16 52.8	17 23.0	9.45345	9.5705	4.50	5.50	19 1 21.2
20	5 17 25.31	17 48.41	25 24 43.7	25 7.5	9.43890	9.4513	4.52	5.48	20 1 24.0
21	5 23 53.97	24 16.90	25 30 28.8	30 45.9	9.42330	9.2951	4.53	5.46	21 1 26.5
22	5 30 8.44	30 31.09	25 34 13.9	34 24.2	9.40656	9.0646	4.55	5.44	22 1 28.8
23	5 36 8.26	36 30.50	25 36 5.0	36 8.5	9.38862	+8.5906	4.56	5.42	23 1 30.9
24	5 41 53.01	42 14.70	25 36 8.1	36 4.9	9.36937	-8.5323	4.57	5.39	24 1 32.7
25	5 47 22.28	47 43.31	25 34 28.9	34 19.2	9.34868	9.0126	4.58	5.36	25 1 34.2
26	5 52 35.67	52 55.91	25 31 13.6	30 57.6	9.32641	9.2244	4.59	5.34	26 1 35.5
27	5 57 32.81	57 52.16	25 26 28.0	26 6.0	9.30235	9.3585	4.60	5.31	27 1 36.5
28	6 2 13.30	2 31.67	25 20 18.1	19 50.4	9.27627	9.4546	4.61	5.28	28 1 37.2
29	6 6 36.76	6 54.04	25 12 49.6	12 16.7	9.24788	9.5282	4.62	5.24	29 1 37.6
30	6 10 42.83	10 58.94	25 4 8.2	3 30.5	9.21686	9.5867	4.63	5.21	30 1 37.7
31	6 14 31.15	14 46.01	24 54 19.4	53 37.4	9.18270	9.6343	4.64	5.17	31 1 37.6
June 1	6 18 1.33	18 14.89	24 43 29.0	42 43.2	9.14483	9.6738	4.65	5.13	1 1 37.1
2	6 21 13.03	21 25.23	24 31 42.3	30 53.3	9.10254	9.7067	4.66	5.09	2 1 36.3
3	6 24 5.91	24 16.71	24 19 4.7	18 13.0	9.05480	9.7344	4.66	5.04	3 1 35.3
4	6 26 39.66	26 49.05	24 5 41.5	4 47.8	9.00023	9.7577	4.67	4.99	4 1 33.9
5	6 28 53.97	29 1.94	23 51 38.1	50 43.0	8.93683	9.7770	4.68	4.93	5 1 32.1
6	6 30 48.50	30 55.14	23 36 59.6	36 3.6	8.86154	9.7932	4.68	4.86	6 1 30.1
7	6 32 23.29	32 28.45	23 21 51.1	20 55.0	8.76947	9.8062	4.68	4.78	7 1 27.7
8	6 33 37.94	33 41.75	23 6 17.8	5 22.1	8.65187	9.8166	4.68	4.67	8 1 25.0
9	6 34 32.48	34 35.01	22 50 25.0	49 30.3	8.48980	9.8242	4.68	4.54	9 1 22.0
10	6 35 6.93	35 8.26	22 34 17.8	33 24.7	8.22974	9.8295	4.68	4.35	10 1 18.6
11	6 35 21.43	35 21.67	22 18 1.3	17 10.4	+7.50440	9.8326	4.68	-3.97	11 1 14.9
12	6 35 16.25	35 15.52	22 1 40.9	0 52.7	-8.01453	9.8331	4.67	+3.56	12 1 10.8
13	6 34 51.82	34 50.26	21 45 22.0	44 36.9	8.37146	9.8312	4.65	4.22	13 1 6.5
14	6 34 8.74	34 6.50	21 29 10.0	28 28.5	8.55893	9.8270	4.63	4.48	14 1 1.8
15	6 33 7.81	33 5.06	21 13 10.5	12 32.9	8.68391	9.8201	4.61	4.64	15 0 56.9
16	6 31 50.04	31 46.96	20 57 29.0	56 55.6	8.77515	9.8103	4.58	4.76	16 0 51.6
17	6 30 16.65	30 13.42	20 42 11.5	41 42.5	8.84480	9.7976	4.53	4.86	17 0 46.1
18	6 28 29.10	28 25.90	20 27 23.9	26 59.5	8.89889	9.7813	4.48	4.94	18 0 40.4
19	6 26 29.06	26 26.05	20 13 12.3	12 52.4	8.94089	9.7617	4.41	5.00	19 0 34.5
20	6 24 18.41	24 15.74	19 59 42.7	59 27.2	8.97286	9.7373	4.31	5.06	20 0 28.4
21	6 21 59.23	21 57.03	19 47 1.2	46 49.9	8.99609	9.7081	4.18	5.12	21 0 22.2
22	6 19 33.76	19 32.14	19 35 13.9	35 6.4	9.01139	9.6730	3.97	5.16	22 0 15.8
23	6 17 4.39	17 3.40	19 24 26.6	24 22.6	9.01919	9.6308	-3.54	5.20	23 0 9.4
24	6 14 33.58	14 33.27	19 14 44.9	14 43.8	9.01974	9.5799	+3.41	5.23	24 0 3.0
25	6 12 3.83	12 4.18	19 6 13.8	6 14.9	9.01301	9.5175	3.93	5.26	24 23 56.6
26	6 9 37.64	9 38.61	18 58 58.0	59 0.7	8.99877	9.4402	4.16	5.28	25 23 50.2
27	6 7 17.44	7 18.96	18 53 1.5	53 5.0	8.97650	9.3410	4.30	5.30	26 23 44.0
28	6 5 5.57	5 7.52	18 48 27.4	48 31.0	8.94524	9.2073	4.41	5.31	27 23 37.9
29	6 3 4.28	3 6.52	18 45 17.9	45 20.7	8.90349	9.0079	4.48	5.32	28 23 32.0
30	6 1 15.61	1 18.00	18 43 34.4	43 35.8	8.84907	-8.6216	4.54	5.32	29 23 26.2
31	5 59 41.41	59 43.77	+18 43 17.4	43 16.7	-8.77815	+8.2591	+4.59	+5.32	30 23 20.7

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>'</sup> <sup>"</sup>					<sup>d</sup> <sup>h</sup> <sup>m</sup>
July 1	5 59 41.41	59 43.77	+18 43 17.4	43 16.7	-8.77815	+8.2591	+4.59	+5.32	0 23 20.7
2	5 58 23.32	58 25.47	18 44 26.3	44 22.9	8.68388	8.8882	4.62	5.31	1 23 15.5
3	5 57 22.78	57 24.54	18 46 59.3	46 52.6	8.55205	9.1301	4.66	5.29	2 23 10.5
4	5 56 41.03	56 42.23	18 50 53.9	50 43.6	8.34665	9.2799	4.68	5.27	3 23 5.9
5	5 56 19.11	56 19.58	18 56 6.6	55 52.4	-7.91001	9.3862	4.70	5.25	4 23 1.7
6	5 56 17.87	56 17.47	19 2 33.2	2 14.9	+7.81175	9.4668	4.71	5.22	5 22 57.7
7	5 56 37.98	56 36.56	19 10 8.5	9 46.1	8.33265	9.5298	4.72	5.18	6 22 54.0
8	5 57 19.98	57 17.43	19 18 46.6	18 20.3	8.56661	9.5800	4.73	5.13	7 22 50.7
9	5 58 24.26	58 20.48	19 28 21.0	27 50.9	8.71976	9.6202	4.74	5.07	8 22 47.9
10	5 59 51.12	59 46.03	19 38 44.3	38 10.8	8.83410	9.6517	4.74	5.00	9 22 45.3
11	6 1 40.76	1 34.30	19 49 49.0	49 12.6	8.92465	9.6759	4.74	4.90	10 22 43.2
12	6 3 53.28	3 45.43	20 1 27.0	0 48.2	8.99995	9.6940	4.74	4.77	11 22 41.5
13	6 6 28.73	6 19.47	20 13 29.5	12 48.9	9.06411	9.7160	4.74	4.56	12 22 40.1
14	6 9 27.08	9 16.42	20 25 47.2	25 5.5	9.11994	9.7122	4.74	+4.14	13 22 39.1
15	6 12 48.29	12 36.25	20 38 10.6	37 28.5	9.16920	9.7126	4.74	-4.02	14 22 38.5
16	6 16 32.23	16 18.87	20 50 29.7	49 48.1	9.21318	9.7070	4.74	4.55	15 22 38.3
17	6 20 38.74	20 24.14	21 2 34.0	1 53.6	9.25282	9.6947	4.73	4.79	16 22 38.4
18	6 25 7.63	24 51.86	21 14 12.6	13 34.2	9.28878	9.6754	4.73	4.95	17 22 38.9
19	6 29 58.61	29 41.80	21 25 14.3	24 38.7	9.32152	9.6475	4.72	5.07	18 22 39.8
20	6 35 11.33	34 53.60	21 35 27.7	34 55.6	9.35146	9.6090	4.71	5.16	19 22 41.1
21	6 40 45.37	40 26.87	21 44 41.0	44 13.1	9.37887	9.5570	4.70	5.24	20 22 42.7
22	6 46 40.21	46 21.10	21 52 42.2	52 19.1	9.40397	9.4863	4.69	5.31	21 22 44.6
23	6 52 55.20	52 35.67	21 59 19.4	59 1.6	9.42690	9.3871	4.67	5.36	22 22 46.9
24	6 59 29.57	59 9.81	22 4 20.6	4 8.4	9.44777	9.2384	4.65	5.41	23 22 49.5
25	7 6 22.40	6 2.62	22 7 34.3	7 27.9	9.46666	8.9757	4.62	5.46	24 22 52.5
26	7 13 32.62	13 13.03	22 8 49.4	8 48.9	9.48362	+7.9315	4.59	5.49	25 22 55.7
27	7 20 58.98	20 39.80	22 7 55.7	8 0.8	9.49867	-8.9253	4.55	5.52	26 22 59.2
28	7 28 40.07	28 21.52	22 4 44.0	4 54.4	9.51184	9.2625	4.50	5.55	27 23 2.9
29	7 36 34.34	36 16.63	21 59 6.2	59 21.4	9.52315	9.4577	4.44	5.56	28 23 6.9
30	7 44 40.09	44 23.41	21 50 56.0	51 15.3	9.53262	9.5960	4.37	5.58	29 23 11.0
31	7 52 55.50	52 40.01	21 40 9.0	40 31.5	9.54027	9.7029	4.27	5.58	30 23 15.3
Aug. 1	8 1 18.69	1 4.55	21 26 42.4	27 7.1	9.54617	9.7894	4.15	5.59	0 23 19.8
2	8 9 47.75	9 35.09	21 10 35.6	11 1.5	9.55039	9.8614	3.98	5.58	1 23 24.4
3	8 18 20.76	18 9.69	20 51 49.9	52 15.8	9.55294	9.9223	3.71	5.57	2 23 29.0
4	8 26 55.90	26 46.47	20 30 28.6	30 53.4	9.55395	9.9744	+2.93	5.56	3 23 33.7
5	8 35 31.40	35 23.64	20 6 36.6	6 59.3	9.55356	0.0193	-3.48	5.54	4 23 38.3
6	8 44 5.65	43 59.58	19 40 20.3	40 39.8	9.55186	0.0580	3.82	5.52	5 23 43.0
7	8 52 37.19	52 32.79	19 11 47.4	12 2.8	9.54899	0.0916	3.98	5.49	6 23 47.6
8	9 1 4.75	1 1.97	18 41 6.4	41 16.9	9.54509	0.1209	4.09	5.46	7 23 52.1
9	9 9 27.24	9 26.04	18 8 26.6	8 31.4	9.54030	0.1461	4.16	5.42	8 23 56.5
10	9 17 43.75	17 44.05	17 33 57.4	33 56.1	9.53472	0.1681	4.21	5.38	10 0 0.9
11	9 25 53.54	25 55.26	16 57 48.5	57 40.6	9.52847	0.1871	4.25	5.34	11 0 5.1
12	9 33 56.03	33 59.10	16 20 9.6	19 54.8	9.52170	0.2035	4.27	5.29	12 0 9.2
13	9 41 50.82	41 55.13	15 41 10.0	40 48.2	9.51450	0.2177	4.28	5.24	13 0 13.2
14	9 49 37.62	49 43.10	15 0 58.5	0 29.6	9.50699	0.2298	4.29	5.18	14 0 17.0
15	9 57 16.27	57 22.82	14 19 43.8	19 7.7	9.49920	0.2401	4.30	5.12	15 0 20.7
16	10 4 46.63	4 54.22	13 37 33.9	36 50.7	9.49127	0.2490	4.30	5.06	16 0 24.3
17	10 12 8.88	12 17.32	12 54 36.5	53 46.4	9.48323	0.2564	4.29	4.99	17 0 27.7
18	10 19 22.94	19 32.22	12 10 58.4	10 1.5	9.47513	0.2626	4.29	4.92	18 0 31.0
19	10 26 28.98	26 39.01	11 26 46.0	25 42.6	9.46704	0.2677	4.28	4.83	19 0 34.2
20	10 33 27.16	33 37.88	10 42 5.5	40 55.9	9.45897	0.2718	4.27	4.74	20 0 37.2
21	10 40 17.69	40 29.03	9 57 2.4	55 46.8	9.45101	0.2750	4.25	4.63	21 0 40.1
22	10 47 0.81	47 12.71	9 11 41.6	10 20.3	9.44314	0.2775	4.24	4.49	22 0 42.9
23	10 53 36.74	53 49.15	8 26 7.9	24 41.2	9.43539	0.2792	4.22	4.34	23 0 45.6
24	11 0 5.74	0 18.62	7 40 25.4	38 53.7	9.42780	0.2803	4.21	4.05	24 0 48.1
25	11 6 28.05	6 41.36	6 54 38.2	53 1.8	9.42033	0.2807	4.19	-3.50	25 0 50.6
26	11 12 43.91	12 57.59	6 8 49.7	7 8.9	9.41302	0.2807	4.17	+3.70	26 0 52.9
27	11 18 53.57	19 7.60	5 23 3.3	21 18.4	9.40588	0.2801	4.16	4.10	27 0 55.1
28	11 24 57.28	25 11.61	4 37 22.1	35 33.4	9.39892	0.2790	4.14	4.29	28 0 57.2
29	11 30 55.26	31 9.87	3 51 49.0	49 56.8	9.39210	0.2775	4.12	4.41	29 0 59.2
30	11 36 47.73	37 2.58	3 6 26.6	4 31.3	9.38545	0.2756	4.11	4.50	30 1 1.1
31	11 42 34.90	42 49.98	+2 21 17.4	19 19.2	+9.37893	-0.2733	-4.09	+4.57	31 1 3.0

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.			Apparent Declination.			Log of $a$ .		Log of $b$ .		Mean Solar Time of Meridian Transit.								
	At Mean Noon.		At Transit.	At Mean Noon.		At Transit.	In R. A.	In Dec.	In R. A.	In Dec.									
	h	m		°	'					d	h	m							
Sept. 1	11	48	16.95	48	32.22	+	1	36	23.7	34	22.9	+	9.37253	-0.2706	-4.08	+4.63	1	1	4.8
2	11	53	54.05	54	9.50			0	51	47.8	49	44.8	9.36629	0.2675	4.06	4.63	2	1	6.5
3	11	59	26.39	59	41.99	+	0	7	32.0	5	27.0	9.36016	0.2641	4.05	4.72	3	1	8.1	
4	12	4	54.11	5	9.82	-	0	36	21.8	38	28.4	9.35412	0.2602	4.04	4.76	4	1	9.6	
5	12	10	17.32	10	33.14			1	19	51.6	21	59.6	9.34815	0.2561	4.02	4.80	5	1	11.0
6	12	15	36.14	15	52.05			2	2	55.5	5	4.7	9.34222	0.2517	4.02	4.82	6	1	12.4
7	12	20	50.65	21	6.63			2	45	31.7	47	41.7	9.33633	0.2468	4.01	4.86	7	1	13.6
8	12	26	0.93	26	16.96			3	27	38.1	29	43.7	9.33045	0.2415	4.00	4.88	8	1	14.8
9	12	31	7.03	31	23.08			4	9	12.9	11	23.7	9.32453	0.2358	4.00	4.91	9	1	16.0
10	12	36	8.96	36	25.02			4	50	14.2	52	25.1	9.31854	0.2297	4.00	4.93	10	1	17.1
11	12	41	6.73	41	22.78			5	30	40.1	32	50.7	9.31247	0.2232	4.00	4.96	11	1	18.1
12	12	46	0.32	46	16.33			6	10	28.6	12	38.7	9.30625	0.2162	4.01	4.98	12	1	19.1
13	12	50	49.67	51	5.62			6	49	37.6	51	46.9	9.29983	0.2087	4.02	5.00	13	1	20.0
14	12	55	34.70	55	50.57			7	28	5.1	3' 13.3	9.29318	0.2007	4.03	5.02	14	1	20.8	
15	13	0	15.30	0	31.06			8	5	48.9	7	55.8	9.28621	0.1921	4.04	5.04	15	1	21.5
16	13	4	51.32	5	6.94			8	42	46.7	44	51.9	9.27887	0.1829	4.06	5.07	16	1	22.2
17	13	9	22.57	9	38.01			9	18	55.8	23	59.0	9.27105	0.1729	4.08	5.09	17	1	22.7
18	13	13	48.82	14	4.06			9	54	13.8	56	14.7	9.26270	0.1621	4.10	5.11	18	1	23.2
19	13	18	9.81	18	24.81			10	28	37.9	30	36.1	9.25370	0.1505	4.13	5.14	19	1	23.6
20	13	22	25.23	22	39.95			11	2	5.1	4	0.4	9.24393	0.1378	4.16	5.16	20	1	24.0
21	13	26	34.70	26	49.10			11	34	32.1	36	24.0	9.23320	0.1240	4.19	5.19	21	1	24.2
22	13	30	37.78	30	51.81			12	5	55.5	7	43.7	9.22136	0.1088	4.22	5.21	22	1	24.2
23	13	34	33.97	34	47.57			12	36	11.3	37	55.5	9.20820	0.0923	4.25	5.24	23	1	24.2
24	13	38	22.72	38	35.85			13	5	15.3	6	55.0	9.19346	0.0738	4.29	5.26	24	1	24.1
25	13	42	3.36	42	15.96			13	33	3.0	34	37.8	9.17681	0.0533	4.33	5.29	25	1	23.8
26	13	45	35.17	45	47.17			13	59	29.3	63	58.7	9.15787	0.0302	4.37	5.32	26	1	23.4
27	13	48	57.32	49	8.65			14	24	28.4	25	52.0	9.13615	0.0041	4.41	5.35	27	1	22.8
28	13	52	8.88	52	19.47			14	47	54.3	49	11.6	9.11100	0.9743	4.45	5.38	28	1	22.1
29	13	55	8.82	55	18.60			15	9	40.0	10	50.6	9.08157	0.9396	4.49	5.42	29	1	21.1
30	13	57	55.99	58	4.90			15	29	37.7	30	41.0	9.04679	0.8989	4.53	5.45	30	1	19.9
Oct. 1	14	0	29.14	0	37.08			15	47	38.9	48	34.5	9.00503	0.8502	4.57	5.48	1	1	18.5
2	14	2	46.86	2	53.78			16	3	34.2	4	21.7	8.95398	0.7905	4.61	5.52	2	1	16.9
3	14	4	47.66	4	53.48			16	17	13.2	17	52.1	8.89014	0.7152	4.65	5.55	3	1	14.9
4	14	6	29.93	6	34.60			16	28	24.2	28	54.1	8.80745	0.6145	4.69	5.59	4	1	12.7
5	14	7	51.94	7	55.41			16	36	54.5	37	15.2	8.69470	0.4703	4.72	5.62	5	1	10.1
6	14	8	51.93	8	54.19			16	42	30.2	42	41.6	8.52626	0.2282	4.76	5.66	6	1	7.1
7	14	9	28.10	9	29.15			16	44	56.5	44	58.6	+8.21565	-8.5081	4.79	5.69	7	1	3.8
8	14	9	38.68	9	38.56			16	43	57.7	43	50.8	-7.28802	+9.0635	4.82	5.73	8	1	0.0
9	14	9	22.00	9	20.81			16	39	17.8	39	2.5	8.33026	0.4392	4.84	5.76	9	0	55.8
10	14	8	36.65	8	34.52			16	30	40.8	30	18.1	8.62055	0.6482	4.86	5.78	10	0	51.1
11	14	7	21.51	7	18.63			16	17	51.8	17	23.1	8.79726	0.7958	4.86	5.80	11	0	45.9
12	14	5	36.01	5	32.64			16	0	38.0	0	5.3	8.92337	0.9097	4.86	5.82	12	0	40.2
13	14	3	20.28	3	16.72			15	38	50.4	38	16.2	9.01949	0.0018	4.85	5.82	13	0	34.0
14	14	0	35.29	0	31.89			15	12	25.9	11	53.2	9.09456	0.0777	4.82	5.81	14	0	27.4
15	13	57	23.10	57	20.22			14	41	29.2	41	1.3	9.15301	0.1403	4.76	5.79	15	0	20.2
16	13	53	46.93	53	44.93			14	6	14.8	5	55.1	9.19723	0.1910	4.67	5.75	16	0	12.7
17	13	49	51.25	49	50.42			13	27	9.4	27	1.1	9.22838	0.2306	4.53	5.66	17	0	4.9
18	13	45	41.74	45	42.30			12	44	52.1	44	57.9	9.24686	0.2594	-4.23	5.52	17	23	56.8
19	13	41	25.17	41	27.20			12	0	15.5	0	37.0	9.25268	0.2771	+2.94	5.26	18	23	48.7
20	13	37	8.99	37	12.42			11	14	23.0	15	0.5	9.24534	0.2836	4.30	+4.04	19	23	40.5
21	13	33	1.09	33	5.70			10	28	26.0	29	18.3	9.22393	0.2784	4.59	-5.23	20	23	32.5
22	13	29	9.17	29	14.60			9	43	39.4	44	43.8	9.18690	0.2610	4.75	5.54	21	23	24.7
23	13	25	40.44	25	46.22			9	1	16.8	2	29.4	9.13159	0.2304	4.85	5.71	22	23	17.3
24	13	22	41.09	22	46.70			8	22	24.9	23	40.9	9.05357	0.1853	4.92	5.81	23	23	10.4
25	13	20	16.03	20	20.95			7	48	0.5	49	14.9	8.94416	0.1238	4.96	5.87	24	23	4.0
26	13	18	28.77	18	32.52			7	18	46.6	19	54.7	8.78392	0.0425	4.98	5.91	25	22	58.3
27	13	17	21.38	17	23.57			6	55	12.5	56	9.9	8.51494	0.9340	4.99	5.93	26	22	53.2
28	13	16	54.54	16	54.87			6	37	32.9	38	16.5	-7.66381	9.7864	4.99	5.93	27	22	48.8
29	13	17	7.78	17	6.07			6	25	50.2	26	17.6	+8.35818	9.5628	4.97	5.92	28	22	45.1
30	13	17	59.65	17	55.83			6	19	56.2	20	6.2	8.68999	+9.1076	4.94	5.90	29	22	41.9
31	13	19	28.04	19	22.12			6	19	34.7	19	27.0	8.86615	-8.9799	4.91	5.87	30	22	39.5
32	13	21	30.34	21	22.42	-		6	24	23.1	23	58.2	+8.98239	-9.4800	+4.87	-5.84	31	22	37.5

FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.											
Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.		
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	d	h	m
Nov. 1	13 21 30.34	21 22.42	— 6 24 23.1	23 58.2	+8.98239	—9.4800	+4.87	—5.84	0	22	37.5
2	13 24 3.61	23 53.84	6 33 55.3	33 14.3	9.06637	9.6896	4.83	5.79	1	22	36.1
3	13 27 4.90	26 53.45	6 47 43.0	46 47.3	9.13006	9.8176	4.78	5.74	2	22	35.2
4	13 30 31.19	30 18.28	7 5 17.7	4 9.0	9.17979	9.9055	4.63	5.68	3	22	34.6
5	13 34 19.67	34 5.49	7 26 11.0	24 51.2	9.21943	9.9699	4.67	5.62	4	22	34.5
6	13 38 27.66	38 12.43	7 49 55.7	48 26.7	9.25141	0.0182	4.61	5.54	5	22	34.6
7	13 42 52.71	42 36.62	8 16 6.4	14 30.0	9.27754	0.0553	4.54	5.47	6	22	35.1
8	13 47 32.64	47 15.87	8 44 19.7	42 37.5	9.29906	0.0840	4.49	5.39	7	22	35.8
9	13 52 25.49	52 8.22	9 14 14.4	12 28.1	9.31691	0.1061	4.43	5.30	8	22	36.8
10	13 57 29.56	57 11.93	9 45 31.1	43 42.1	9.33183	0.1231	4.37	5.19	9	22	37.9
11	14 2 43.36	2 25.50	10 17 52.6	16 2.1	9.34437	0.1358	4.31	5.08	10	22	39.2
12	14 8 5.61	7 47.62	10 51 3.5	49 12.6	9.35498	0.1450	4.25	4.94	11	22	40.6
13	14 13 35.21	13 17.20	11 24 50.5	23 0.1	9.36403	0.1515	4.19	4.76	12	22	42.1
14	14 19 11.23	18 53.28	11 59 1.5	57 12.5	9.37178	0.1554	4.13	4.51	13	22	43.8
15	14 24 52.87	24 35.06	12 33 26.0	31 39.0	9.37848	0.1572	4.08	—4.03	14	22	45.5
16	14 30 39.48	30 21.88	13 7 54.9	6 10.6	9.38435	0.1572	4.03	+3.97	15	22	47.4
17	14 36 30.51	36 13.16	13 42 19.9	40 38.6	9.38952	0.1556	3.98	4.43	16	22	49.3
18	14 42 25.51	42 8.47	14 16 33.9	14 56.2	9.39413	0.1526	3.94	4.62	17	22	51.2
19	14 48 24.09	48 7.40	14 50 30.7	48 56.8	9.39825	0.1483	3.90	4.74	18	22	53.3
20	14 54 25.94	54 9.63	15 24 4.6	22 34.8	9.40202	0.1428	3.86	4.83	19	22	55.4
21	15 0 30.81	0 14.91	15 57 10.6	55 45.1	9.40549	0.1362	3.83	4.89	20	22	57.5
22	15 6 38.49	6 23.03	16 29 44.3	28 23.2	9.40871	0.1286	3.80	4.94	21	22	59.7
23	15 12 48.82	12 33.83	17 1 41.9	0 25.3	9.41173	0.1199	3.78	4.98	22	23	1.9
24	15 19 1.66	18 47.16	17 32 59.8	31 47.9	9.41458	0.1104	3.76	5.01	23	23	4.2
25	15 25 16.90	25 2.91	18 3 34.8	2 27.5	9.41731	0.0999	3.75	5.04	24	23	6.5
26	15 31 34.47	31 21.02	18 33 24.0	32 21.7	9.41995	0.0885	3.74	5.07	25	23	8.9
27	15 37 54.30	37 41.41	19 2 24.7	1 26.6	9.42251	0.0761	3.73	5.09	26	23	11.3
28	15 44 16.36	44 4.03	19 30 34.6	20 41.1	9.42501	0.0626	3.72	5.11	27	23	13.7
29	15 50 40.59	50 28.85	19 57 51.3	57 2.3	9.42745	0.0482	3.71	5.12	28	23	16.1
30	15 57 6.97	56 55.84	20 24 12.8	23 28.2	9.42986	0.0328	3.71	5.14	29	23	18.6
Dec. 1	16 3 35.48	3 24.97	20 49 37.0	48 56.7	9.43221	0.0163	3.70	5.16	0	23	21.2
2	16 10 6.08	9 56.22	21 14 1.9	13 25.8	9.43453	9.9984	3.70	5.17	1	23	23.8
3	16 16 38.77	16 29.57	21 37 25.9	36 53.8	9.43683	9.9793	3.70	5.18	2	23	26.4
4	16 23 13.53	23 5.00	21 59 47.2	59 19.0	9.43911	9.9587	3.70	5.19	3	23	29.0
5	16 29 50.35	29 42.52	22 21 4.2	20 39.7	9.44135	9.9365	3.69	5.20	4	23	31.7
6	16 36 29.21	36 22.09	22 41 15.2	40 54.3	9.44357	9.9126	3.69	5.21	5	23	34.4
7	16 43 10.09	43 3.70	23 0 18.6	0 1.0	9.44573	9.8866	3.68	5.22	6	23	37.1
8	16 49 52.95	49 47.31	23 18 12.8	17 58.3	9.44787	9.8584	3.68	5.23	7	23	39.9
9	16 56 37.79	56 32.91	23 34 56.5	34 44.9	9.44997	9.8275	3.67	5.24	8	23	42.7
10	17 3 24.57	3 20.47	23 50 28.1	50 19.1	9.45201	9.7935	3.66	5.25	9	23	45.5
11	17 10 13.24	9 9.95	24 4 46.2	4 39.6	9.45401	9.7559	3.65	5.26	10	23	48.4
12	17 17 3.76	17 1.28	24 17 49.4	17 44.9	9.45594	9.7139	3.64	5.26	11	23	51.3
13	17 23 56.08	23 54.44	24 29 36.2	29 33.5	9.45781	9.6666	3.62	5.27	12	23	54.3
14	17 30 50.15	30 49.35	24 40 5.3	40 4.2	9.45959	9.6123	3.60	5.28	13	23	57.2
15	17 37 45.88	37 45.94	24 49 15.2	49 15.3	9.46130	9.5491	3.58	5.29	15	0	0.2
16	17 44 43.21	44 44.15	24 57 4.6	57 5.6	9.46291	9.4738	3.56	5.30	16	0	3.2
17	17 51 42.04	51 43.87	25 3 32.2	3 33.7	9.46442	9.3810	3.53	5.30	17	0	6.3
18	17 58 42.28	58 45.01	25 8 36.7	8 38.4	9.46583	9.2608	3.49	5.31	18	0	9.4
19	18 5 43.81	5 47.45	25 12 16.8	12 18.3	9.46711	9.0906	3.46	5.32	19	0	12.4
20	18 12 46.53	12 51.10	25 14 31.1	14 32.1	9.46826	8.8007	3.40	5.32	20	0	15.5
21	18 19 50.29	19 55.79	25 15 18.4	15 18.4	9.46924	—7.3857	3.33	5.33	21	0	18.7
22	18 26 54.94	27 1.38	25 14 37.7	14 36.4	9.47008	+8.7708	3.24	5.33	22	0	21.8
23	18 34 0.31	34 7.69	25 12 27.8	12 24.8	9.47071	9.0843	3.11	5.34	23	0	25.0
24	18 41 6.21	41 14.54	25 8 47.7	8 42.5	9.47115	9.2659	2.89	5.34	24	0	28.1
25	18 48 12.43	48 21.70	25 3 36.3	3 28.5	9.47138	9.3947	+2.50	5.35	25	0	31.3
26	18 55 18.78	55 28.98	24 56 52.8	56 42.0	9.47139	9.4947	—2.46	5.35	26	0	34.5
27	19 2 25.01	2 36.14	24 48 36.3	48 22.1	9.47112	9.5766	3.00	5.35	27	0	37.6
28	19 9 30.82	9 42.87	24 38 46.3	38 28.3	9.47053	9.6459	3.24	5.36	28	0	40.8
29	19 16 35.89	16 48.84	24 27 22.1	26 59.8	9.46963	9.7058	3.40	5.36	29	0	43.9
30	19 23 39.91	23 53.75	24 14 23.5	13 56.5	9.46835	9.7586	3.54	5.36	30	0	47.1
31	19 30 42.49	30 57.19	23 59 50.4	59 18.3	9.46668	9.8056	3.65	5.36	31	0	50.2
32	19 37 43.22	37 58.73	—23 43 42.6	43 5.2	+9.46454	+9.8461	—3.75	+5.36	32	0	53.2



## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>o</sup> <sup>'</sup> <sup>"</sup>	<sup>'</sup> <sup>"</sup> <sup>'''</sup>					<sup>d</sup> <sup>h</sup> <sup>m</sup>
Jan. 1	16 35 54.54	35 26.39	20 39 12.1	38 2.5	+0.33666	-0.7285	+3.39	+4.92	0 21 50.3
2	16 41 7.64	40 39.66	20 51 45.4	50 39.6	0.33804	9.7086	3.37	4.92	1 21 51.5
3	16 46 21.73	45 53.94	21 3 43.8	2 41.8	0.33937	9.6872	3.36	4.93	2 21 52.8
4	16 51 36.76	51 9.18	21 15 6.5	14 8.3	0.34065	9.6643	3.34	4.94	3 21 54.1
5	16 56 52.69	56 25.33	21 25 52.9	24 58.5	0.34188	9.6396	3.34	4.95	4 21 55.4
6	17 2 9.51	1 42.36	21 36 2.5	35 11.8	0.34303	9.6135	3.33	4.95	5 21 56.7
7	17 7 27.14	7 0.22	21 45 34.9	44 47.9	0.34412	9.5849	3.28	4.96	6 21 58.1
8	17 12 45.57	12 18.88	21 54 29.6	53 46.3	0.34521	9.5541	3.26	4.96	7 21 59.5
9	17 18 4.75	17 38.31	22 2 46.1	2 6.5	0.34617	9.5203	3.22	4.97	8 22 0.9
10	17 23 24.62	22 58.43	22 10 23.7	9 47.8	0.34717	9.4831	3.20	4.97	9 22 2.3
11	17 28 45.11	28 19.20	22 17 22.2	16 49.9	0.34789	9.4425	3.15	4.97	10 22 3.7
12	17 34 6.20	33 40.56	22 23 41.4	23 12.6	0.34865	9.3972	3.12	4.98	11 22 5.1
13	17 39 27.80	39 2.44	22 29 20.8	28 55.5	0.34935	9.3461	3.08	4.98	12 22 6.5
14	17 44 49.89	44 24.80	22 34 20.1	33 58.2	0.34998	9.2880	3.02	4.98	13 22 7.9
15	17 50 12.41	49 47.60	22 38 39.2	38 20.7	0.35047	9.2200	2.91	4.99	14 22 9.3
16	17 55 35.29	55 10.77	22 42 17.7	42 2.6	0.35090	9.1387	2.86	4.99	15 22 10.7
17	18 0 58.47	0 34.24	22 45 15.2	45 3.4	0.35131	9.0386	2.81	4.99	16 22 12.1
18	18 6 21.91	5 57.98	22 47 31.7	47 23.1	0.35160	8.9057	2.66	5.00	17 22 13.5
19	18 11 45.55	11 21.95	22 49 7.0	49 1.5	0.35186	8.7144	2.49	5.00	18 22 15.0
20	18 17 9.32	16 46.05	22 50 0.8	49 58.4	0.35198	-8.3588	2.16	5.00	19 22 16.5
21	18 22 33.18	22 10.24	22 50 13.0	50 13.5	0.35202	+7.7811	+1.38	5.00	20 22 18.0
22	18 27 57.05	27 34.44	22 49 43.7	49 47.0	0.35201	8.5397	-1.68	5.00	21 22 19.5
23	18 33 20.90	32 58.62	22 48 33.1	48 39.2	0.35194	8.8026	2.28	5.00	22 22 20.9
24	18 38 44.67	38 22.73	22 46 41.0	46 49.9	0.35181	8.9655	2.56	5.00	23 22 22.4
25	18 44 8.31	43 46.72	22 44 7.4	44 19.0	0.35159	9.0829	2.71	5.00	24 22 23.9
26	18 49 31.73	49 10.49	22 40 52.4	41 6.5	0.35129	9.1753	2.80	5.00	25 22 25.4
27	18 54 54.89	54 33.98	22 36 56.0	37 12.5	0.35084	9.2514	2.85	5.00	26 22 26.8
28	19 0 17.74	59 57.16	22 32 18.5	32 37.4	0.35035	9.3164	2.89	5.00	27 22 28.2
29	19 5 40.24	5 20.00	22 26 59.7	27 20.8	0.34993	9.3725	2.95	4.99	28 22 29.6
30	19 11 2.34	10 42.44	22 21 0.1	21 23.5	0.34937	9.4214	3.04	4.99	29 22 31.0
31	19 16 23.98	16 4.44	22 14 20.0	14 45.5	0.34871	9.4655	3.10	4.99	30 22 32.5
Feb. 1	19 21 45.11	21 25.93	22 6 59.5	7 27.0	0.34795	9.5052	3.15	4.98	31 22 33.9
2	19 27 5.67	26 46.83	21 58 58.8	59 28.2	0.34718	9.5409	3.18	4.98	1 22 35.3
3	19 32 25.62	32 7.13	21 50 18.5	50 49.7	0.34630	9.5736	3.22	4.98	2 22 36.7
4	19 37 44.92	37 26.78	21 40 58.5	41 31.3	0.34536	9.6048	3.23	4.97	3 22 38.1
5	19 43 3.51	42 45.71	21 30 59.3	31 33.8	0.34440	9.6332	3.24	4.97	4 22 39.4
6	19 48 21.36	48 3.88	21 20 21.5	20 57.6	0.34333	9.6593	3.28	4.96	5 22 40.7
7	19 53 38.42	53 21.27	21 9 5.4	9 43.0	0.34223	9.6837	3.30	4.96	6 22 42.0
8	19 58 54.64	58 37.84	20 57 11.5	57 50.4	0.34108	9.7067	3.32	4.96	7 22 43.4
9	20 4 10.01	3 53.56	20 44 40.0	45 20.2	0.33983	9.7283	3.34	4.95	8 22 44.8
10	20 9 24.46	9 8.35	20 31 31.6	32 13.0	0.33857	9.7484	3.35	4.94	9 22 46.1
11	20 14 37.97	14 22.19	20 17 46.8	18 29.3	0.33721	9.7674	3.37	4.93	10 22 47.4
12	20 19 50.51	19 35.06	20 3 26.1	4 9.6	0.33587	9.7855	3.38	4.93	11 22 48.7
13	20 25 2.05	24 46.93	19 48 30.0	49 14.5	0.33443	9.8024	3.40	4.92	12 22 50.0
14	20 30 12.54	29 57.73	19 32 59.3	33 44.6	0.33299	9.8185	3.41	4.92	13 22 51.2
15	20 35 22.00	35 7.50	19 16 54.4	17 40.5	0.33149	9.8338	3.42	4.91	14 22 52.4
16	20 40 30.37	40 16.18	19 0 15.8	1 2.6	0.32997	9.8483	3.42	4.90	15 22 53.6
17	20 45 37.65	45 23.75	18 43 4.3	43 51.8	0.32844	9.8621	3.43	4.89	16 22 54.8
18	20 50 43.84	50 30.23	18 25 20.3	26 8.4	0.32685	9.8751	3.44	4.88	17 22 55.9
19	20 55 48.91	55 35.59	18 7 4.7	7 53.3	0.32521	9.8877	3.44	4.88	18 22 57.0
20	21 0 52.84	0 39.80	17 48 17.9	49 7.0	0.32358	9.8993	3.44	4.86	19 22 58.1
21	21 5 55.64	5 42.88	17 29 0.8	29 50.2	0.32197	9.9108	3.44	4.86	20 22 59.2
22	21 10 57.31	10 44.83	17 9 13.8	10 3.5	0.32034	9.9216	3.44	4.84	21 23 0.3
23	21 15 57.84	15 45.64	16 48 57.6	49 47.6	0.31872	9.9317	3.44	4.83	22 23 1.4
24	21 20 57.24	20 45.31	16 28 13.1	29 3.4	0.31707	9.9416	3.44	4.83	23 23 2.5
25	21 25 55.50	25 43.82	16 7 1.0	7 51.5	0.31542	9.9509	3.43	4.81	24 23 3.5
26	21 30 52.65	30 41.22	15 45 21.8	46 12.4	0.31381	9.9599	3.43	4.80	25 23 4.5
27	21 35 48.69	35 37.51	15 23 16.3	24 6.9	0.31217	9.9683	3.43	4.79	26 23 6.5
28	21 40 43.61	40 32.68	15 0 45.2	1 36.0	0.31052	9.9764	3.43	4.78	27 23 6.5
29	21 45 37.45	45 26.75	14 37 49.1	38 39.9	0.30889	9.9842	3.42	4.77	28 23 7.4
30	21 50 30.20	50 19.71	14 14 28.9	15 19.6	0.30730	9.9916	3.41	4.75	29 23 8.3
31	21 55 21.88	55 11.61	-13 50 45.1	51 35.7	+0.30574	+9.9987	-3.41	+4.74	30 23 9.2

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of a.		Log of b.		Mean Solar Time of Meridian Transit.	
	At Mean Noon.			At Transit.	At Mean Noon.			At Transit.	In R. A.	In Dec.	In R. A.	In Dec.		
	h	m	s	m	°	'	"	°						'
Mar. 1	21	45	37.45	45 26.75	-14	37	49.1	38 30.9	+0.30889	+0.9842	-3.42	+4.77	0 23 7.4	
2	21	50	30.20	50 19.71	14	14	28.9	15 19.6	9.30730	9.9916	3.41	4.75	1 23 8.3	
3	21	55	21.88	55 11.61	13	50	45.1	51 35.7	9.30574	9.9987	3.41	4.74	2 23 9.2	
4	22	0	12.51	0 2.48	13	26	38.5	27 28.9	9.30416	0.0054	3.40	4.72	3 23 10.2	
5	22	5	2.10	4 52.28	13	2	10.0	3 0.2	9.30266	0.0118	3.39	4.71	4 23 11.1	
6	22	9	50.67	9 41.07	12	37	20.2	38 10.2	9.30112	0.0179	3.38	4.70	5 23 12.0	
7	22	14	38.25	14 28.86	12	12	9.8	12 59.6	9.29964	0.0237	3.37	4.68	6 23 12.9	
8	22	19	24.86	19 15.66	11	46	39.6	47 29.1	9.29822	0.0292	3.36	4.66	7 23 13.7	
9	22	24	10.53	24 1.52	11	20	50.4	21 39.6	9.29676	0.0344	3.36	4.64	8 23 14.5	
10	22	28	55.25	28 46.43	10	54	42.7	55 31.7	9.29533	0.0395	3.34	4.63	9 23 15.3	
11	22	33	39.08	33 30.44	10	28	17.5	29 6.2	9.29398	0.0441	3.33	4.60	10 23 16.1	
12	22	38	22.01	38 13.54	10	1	35.5	2 23.8	9.29263	0.0485	3.32	4.59	11 23 16.8	
13	22	43	4.08	42 53.77	9	34	37.4	35 25.3	9.29135	0.0529	3.29	4.58	12 23 17.5	
14	22	47	45.34	47 37.19	9	7	23.8	8 11.3	9.29013	0.0568	3.28	4.55	13 23 18.2	
15	22	52	25.81	52 17.82	8	39	55.4	40 42.6	9.28889	0.0606	3.27	4.53	14 23 18.9	
16	22	57	5.50	56 57.68	8	12	13.1	12 59.8	9.28773	0.0641	3.25	4.50	15 23 19.7	
17	23	1	44.45	1 36.79	7	44	17.9	45 4.0	9.28657	0.0675	3.24	4.48	16 23 20.4	
18	23	6	22.69	6 15.18	7	16	10.2	16 55.9	9.28554	0.0705	3.21	4.44	17 23 21.1	
19	23	11	0.27	10 52.92	6	47	50.9	48 36.1	9.28450	0.0734	3.20	4.42	18 23 21.8	
20	23	15	37.21	15 30.01	6	19	20.7	20 5.4	9.28352	0.0761	3.16	4.39	19 23 22.5	
21	23	20	13.56	20 6.50	5	50	40.3	51 24.4	9.28263	0.0786	3.12	4.36	20 23 23.2	
22	23	24	49.35	24 42.42	5	21	50.2	22 33.8	9.28176	0.0810	3.11	4.33	21 23 23.8	
23	23	29	24.62	29 17.82	4	52	51.3	53 34.4	9.28096	0.0830	3.07	4.27	22 23 24.4	
24	23	33	59.39	33 52.74	4	23	44.4	24 26.8	9.28025	0.0849	3.02	4.24	23 23 25.1	
25	23	38	33.73	38 27.20	3	54	30.2	55 12.0	9.27955	0.0866	3.00	4.23	24 23 25.7	
26	23	43	7.66	43 1.25	3	25	9.3	25 50.6	9.27896	0.0882	2.93	4.16	25 23 26.3	
27	23	47	41.24	47 34.96	2	55	42.4	56 23.1	9.27845	0.0896	2.87	4.10	26 23 26.9	
28	23	52	14.51	52 8.35	2	26	10.4	26 50.5	9.27798	0.0907	2.83	4.03	27 23 27.5	
29	23	56	47.50	56 41.46	1	56	33.9	57 13.3	9.27755	0.0917	2.76	3.96	28 23 28.1	
30	0	1	20.25	1 14.32	1	26	53.6	27 32.3	9.27721	0.0927	2.66	3.91	29 23 28.7	
31	0	5	52.81	5 47.00	0	57	10.0	57 48.0	9.27694	0.0933	2.56	3.78	30 23 29.3	
Apr. 1	0	10	25.22	10 19.55	-	0	27	23.9	28 1.2	9.27675	0.0938	2.38	3.59	0 23 30.0
2	0	14	57.53	14 51.97	+	0	2	23.8	1 47.3	9.27662	0.0941	2.16	3.38	1 23 30.6
3	0	19	29.77	19 24.33		0	32	12.5	31 36.7	9.27658	0.0943	-1.68	+2.68	2 23 31.2
4	0	24	2.01	23 56.68		1	2	1.6	1 26.6	9.27656	0.0943	+1.38	-2.68	3 23 31.8
5	0	28	34.25	28 29.03		1	31	50.3	31 16.1	9.27662	0.0941	2.23	3.46	4 23 32.4
6	0	33	6.56	33 1.45		2	1	37.9	1 4.4	9.27675	0.0937	2.34	3.63	5 23 33.0
7	0	37	38.95	37 33.96		2	31	23.4	30 50.7	9.27693	0.0932	2.46	3.76	6 23 33.6
8	0	42	11.49	42 6.61		3	1	6.4	0 34.5	9.27720	0.0925	2.62	3.86	7 23 34.2
9	0	46	44.20	46 39.42		3	30	46.2	30 15.1	9.27750	0.0916	2.71	3.98	8 23 34.8
10	0	51	17.14	51 12.47		4	0	22.1	59 51.8	9.27786	0.0905	2.76	4.05	9 23 35.4
11	0	55	50.32	55 45.76		4	29	53.2	29 23.8	9.27830	0.0893	2.83	4.10	10 23 36.0
12	1	0	23.79	0 19.35		4	59	19.0	58 50.3	9.27879	0.0879	2.91	4.17	11 23 36.6
13	1	4	57.69	4 53.28		5	28	38.5	28 10.7	9.27931	0.0862	2.96	4.23	12 23 37.3
14	1	9	31.77	9 27.56		5	57	51.1	57 24.3	9.27996	0.0844	3.01	4.26	13 23 37.9
15	1	14	6.35	14 2.25		6	26	56.0	26 39.0	9.28064	0.0825	3.04	4.30	14 23 38.5
16	1	18	41.38	18 37.38		6	55	52.6	55 27.5	9.28138	0.0802	3.06	4.35	15 23 39.1
17	1	23	16.89	23 13.01		7	24	49.0	24 15.9	9.28214	0.0779	3.09	4.36	16 23 39.8
18	1	27	52.91	27 49.17		7	53	17.7	52 54.5	9.28301	0.0753	3.13	4.40	17 23 40.5
19	1	32	29.49	32 25.88		8	21	44.8	21 22.6	9.28387	0.0725	3.17	4.43	18 23 41.2
20	1	37	6.67	37 3.17		8	50	0.6	49 39.3	9.28486	0.0695	3.20	4.46	19 23 41.9
21	1	41	44.48	41 41.10		9	18	4.4	17 44.0	9.28592	0.0663	3.22	4.48	20 23 42.5
22	1	46	22.95	46 19.70		9	45	55.5	45 36.1	9.28696	0.0631	3.22	4.51	21 23 43.2
23	1	51	2.14	51 59.02		10	13	33.2	13 14.8	9.28808	0.0594	3.25	4.54	22 23 43.9
24	1	55	42.05	55 39.06		10	40	56.8	40 39.3	9.28925	0.0554	3.28	4.56	23 23 44.6
25	2	0	22.74	0 19.89		11	8	5.3	7 48.9	9.29046	0.0514	3.29	4.58	24 23 45.4
26	2	5	4.24	5 1.54		11	34	58.2	34 43.0	9.29170	0.0471	3.30	4.60	25 23 46.2
27	2	9	46.56	9 44.01		12	1	35.0	1 20.7	9.29306	0.0426	3.33	4.61	26 23 47.0
28	2	14	29.75	14 27.35		12	27	54.7	27 41.4	9.29445	0.0379	3.35	4.63	27 23 47.8
29	2	19	13.86	19 11.69		12	53	56.6	53 44.2	9.29581	0.0328	3.35	4.65	28 23 48.5
30	2	23	58.90	23 56.78		13	19	39.8	19 28.4	9.29722	0.0275	3.36	4.66	29 23 49.3
31	2	28	44.89	28 42.92	+13	45	3.7	44 53.3	+0.29873	+0.0219	+3.38	-4.63	30 23 50.1	

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
May	h m s	m s	+13 45 3.7	44 53.3	+9.29873	+0.0219	+3.38	-4.68	d h m
	2 28 44.89	28 42.92	14 10 7.7	9 58.3	9.30023	0.0160	3.38	-4.70	0 23 50.1
	2 33 31.86	33 30.06	14 34 50.8	34 42.4	9.30179	0.0097	3.40	-4.71	1 23 51.0
	2 38 19.85	38 18.21	14 59 12.5	59 5.1	9.30329	0.0033	3.40	-4.72	2 23 51.8
	2 43 8.85	43 7.38	15 23 12.0	23 5.8	9.30489	9.9965	3.41	-4.74	3 23 52.7
	2 47 58.89	47 57.60	15 46 48.6	46 43.2	9.30653	9.9893	3.42	-4.76	4 23 53.6
	2 52 49.99	52 48.88	16 10 1.4	9 57.0	9.30814	9.9819	3.42	-4.77	5 23 54.5
	2 57 42.20	57 41.26	16 32 49.8	32 46.4	9.30974	9.9739	3.42	-4.78	6 23 55.4
	3 2 35.48	2 34.72	16 55 13.1	55 10.6	9.31136	9.9656	3.43	-4.80	7 23 56.3
	3 7 29.86	7 29.31	17 17 10.2	17 8.7	9.31303	9.9569	3.44	-4.81	8 23 57.3
	3 12 25.35	12 25.00	17 38 40.7	38 40.1	9.31465	9.9480	3.44	-4.82	9 23 58.3
	3 17 21.98	17 21.82	17 59 43.9	59 44.2	9.31631	9.9383	3.44	-4.83	10 23 59.3
	3 22 19.70	22 19.76	18 20 19.0	20 20.1	9.31795	9.9283	3.43	-4.84	11 0 0.3
	3 27 18.57	27 18.84	18 40 25.2	40 27.2	9.31954	9.9179	3.43	-4.85	12 0 1.3
	3 32 18.56	32 19.06	19 0 4.9	0 4.9	9.32117	9.9072	3.43	-4.86	13 0 2.4
	3 37 19.67	37 20.40	19 19 8.6	19 12.3	9.32280	9.8952	3.43	-4.87	14 0 3.5
	3 42 21.89	42 22.86	19 37 44.1	37 48.5	9.32435	9.8829	3.42	-4.88	15 0 4.6
	3 47 25.23	47 26.43	19 55 48.0	55 53.0	9.32595	9.8703	3.42	-4.89	16 0 5.7
	3 52 29.67	52 31.10	20 13 19.6	13 25.3	9.32750	9.8567	3.42	-4.90	17 0 6.8
	3 57 35.21	57 36.91	20 30 18.2	30 24.6	9.32899	9.8427	3.41	-4.91	18 0 8.0
	4 2 41.82	2 43.79	20 46 43.3	46 50.3	9.33053	9.8275	3.40	-4.92	19 0 9.2
	4 7 49.49	7 51.72	21 2 34.1	2 41.6	9.33198	9.8118	3.39	-4.92	20 0 10.4
	4 12 58.24	13 0.73	21 17 50.1	17 58.1	9.33341	9.7952	3.39	-4.92	21 0 11.6
	4 18 8.00	18 10.76	21 32 30.6	32 39.0	9.33481	9.7775	3.38	-4.93	22 0 12.8
	4 23 18.78	23 21.81	21 46 35.1	46 43.9	9.33616	9.7590	3.37	-4.94	23 0 14.0
	4 28 30.55	28 33.87	22 0 12.3	0 12.3	9.33750	9.7392	3.36	-4.94	24 0 15.3
	4 33 43.29	33 46.90	22 12 54.1	13 3.4	9.33875	9.7179	3.35	-4.95	25 0 16.6
	4 38 56.96	39 0.87	22 25 7.2	25 16.7	9.34000	9.6955	3.33	-4.96	26 0 17.9
	4 44 11.53	44 15.73	22 36 42.2	36 51.8	9.34116	9.6716	3.30	-4.97	27 0 19.2
	4 49 26.98	49 31.47	22 47 38.6	47 48.2	9.34230	9.6457	3.28	-4.98	28 0 20.5
	4 54 43.28	54 48.07	22 57 55.9	58 5.4	9.34334	9.6183	3.25	-4.98	29 0 21.8
	5 0 0.37	0 5.46	23 7 33.6	7 43.2	9.34436	9.5880	3.24	-4.99	30 0 23.1
June	5 5 18.20	5 23.59	23 16 31.2	16 40.5	9.34528	9.5556	3.20	-4.99	1 0 24.4
	5 10 36.75	10 42.46	23 24 48.5	24 57.5	9.34619	9.5203	3.17	-5.00	2 0 25.8
	5 15 55.98	16 2.01	23 32 25.1	32 33.8	9.34699	9.4813	3.13	-5.00	3 0 27.2
	5 21 15.83	21 22.19	23 39 20.5	39 28.8	9.34775	9.4383	3.11	-5.00	4 0 28.6
	5 26 36.22	26 42.90	23 45 34.5	45 42.2	9.34840	9.3894	3.05	-5.01	5 0 30.0
	5 31 57.14	32 4.14	23 51 6.6	51 13.7	9.34902	9.3348	3.01	-5.01	6 0 31.4
	5 37 18.54	37 25.87	23 55 56.7	56 3.1	9.34950	9.2715	2.89	-5.01	7 0 32.8
	5 42 40.35	42 48.00	24 0 4.6	0 10.2	9.34993	9.1973	2.85	-5.01	8 0 34.2
	5 48 2.50	48 10.47	24 3 30.1	3 34.7	9.35026	9.1072	2.73	-5.01	9 0 35.6
	5 53 24.93	53 33.22	24 6 12.9	6 16.7	9.35053	8.9914	2.61	-5.01	10 0 37.0
	5 58 47.58	58 56.20	24 8 12.8	8 15.6	9.35069	8.8342	2.40	-5.01	11 0 38.5
	6 4 10.40	4 19.35	24 9 30.0	9 31.7	9.35079	8.5906	+2.00	-5.01	12 0 39.9
	6 9 33.32	9 42.60	24 10 4.5	10 4.9	9.35078	+7.9454	-2.08	-5.02	13 0 41.3
	6 14 56.30	15 5.91	24 9 55.8	9 54.9	9.35072	-8.3187	2.46	-5.02	14 0 42.8
	6 20 19.24	20 29.17	24 9 4.2	9 1.8	9.35056	8.7073	2.61	-5.02	15 0 44.3
	6 25 42.10	25 52.35	24 7 29.3	7 25.4	9.35030	8.9083	2.73	-5.01	16 0 45.7
	6 31 4.81	31 15.38	24 5 11.3	5 5.9	9.35002	9.0436	2.78	-5.01	17 0 47.2
	6 36 27.30	36 38.17	24 2 10.6	2 3.6	9.34963	9.1472	2.89	-5.01	18 0 48.6
	6 41 49.52	42 0.70	23 58 27.4	58 18.6	9.34916	9.2304	2.96	-5.01	19 0 50.0
	6 47 11.43	47 22.93	23 54 1.4	53 50.8	9.34860	9.3001	3.03	-5.01	20 0 51.5
	6 52 32.96	52 44.77	23 48 52.9	48 40.5	9.34796	9.3598	3.08	-5.01	21 0 52.9
	6 57 54.04	58 6.14	23 43 2.2	42 47.8	9.34725	9.4123	3.12	-5.01	22 0 54.3
	7 3 14.63	3 27.02	23 36 29.5	36 13.1	9.34648	9.4586	3.16	-5.00	23 0 55.7
	7 8 34.66	8 47.34	23 29 15.1	28 56.6	9.34559	9.5001	3.20	-5.00	24 0 57.1
	7 13 54.10	14 7.05	23 21 19.2	20 58.6	9.34464	9.5378	3.23	-5.00	25 0 58.4
	7 19 12.87	19 26.09	23 12 42.1	12 19.3	9.34369	9.5721	3.25	-4.99	26 0 59.8
	7 24 30.93	24 44.43	23 3 24.3	2 59.2	9.34262	9.6039	3.28	-4.99	27 1 1.2
	7 29 48.25	30 2.03	22 53 26.0	52 58.6	9.34153	9.6333	3.30	-4.98	28 1 2.6
	7 35 4.80	35 18.84	22 42 47.8	42 18.0	9.34034	9.6606	3.33	-4.98	29 1 4.0
	7 40 20.50	40 34.80	+22 31 29.8	30 57.6	+9.33908	-9.6853	-3.35	-4.97	30 1 5.3
	7 45 35.32	45 49.85							31 1 6.5

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.		
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.			
	h m s	m s	° ' "	° ' "					d	h	m
July 1	7 45 35.32	45 49.85	+22 31 29.9	30 57.7	+9.33908	-9.6853	-3.35	-4.97	1	1	6.5
2	7 50 49.22	51 3.98	22 19 32.8	18 58.1	9.33778	9.7089	3.36	4.97	2	1	7.8
3	7 56 2.16	56 17.16	22 6 57.2	6 20.0	9.33648	9.7309	3.37	4.96	3	1	9.1
4	8 1 14.14	1 29.37	21 53 43.4	53 3.6	9.33510	9.7518	3.39	4.96	4	1	10.4
5	8 6 25.09	6 40.54	21 39 51.8	39 9.4	9.33360	9.7713	3.42	4.95	5	1	11.6
6	8 11 34.96	11 50.60	21 25 22.9	24 38.0	9.33208	9.7898	3.42	4.95	6	1	12.8
7	8 16 43.74	16 59.58	21 10 17.5	9 30.0	9.33050	9.8071	3.44	4.94	7	1	14.0
8	8 21 51.39	22 7.43	20 54 36.2	53 46.1	9.32894	9.8236	3.44	4.93	8	1	15.2
9	8 26 57.90	27 14.11	20 38 19.4	37 26.7	9.32728	9.8393	3.44	4.93	9	1	16.3
10	8 32 3.26	32 19.64	20 21 27.6	20 32.3	9.32560	9.8541	3.46	4.92	10	1	17.4
11	8 37 7.42	37 23.97	20 4 1.7	3 3.8	9.32390	9.8682	3.46	4.91	11	1	18.5
12	8 42 10.38	42 27.09	19 46 2.1	45 1.5	9.32214	9.8817	3.47	4.90	12	1	19.6
13	8 47 12.11	47 29.00	19 27 29.5	26 26.1	9.32039	9.8943	3.47	4.89	13	1	20.8
14	8 52 12.62	52 29.65	19 8 24.6	7 18.6	9.31857	9.9065	3.48	4.88	14	1	21.8
15	8 57 11.87	57 29.04	18 48 48.1	47 39.6	9.31677	9.9180	3.48	4.87	15	1	22.8
16	9 2 9.87	2 27.17	18 28 40.8	27 29.7	9.31492	9.9289	3.48	4.86	16	1	23.8
17	9 7 6.61	7 24.07	18 8 3.3	6 49.4	9.31311	9.9396	3.48	4.86	17	1	24.9
18	9 12 2.10	12 19.69	17 46 56.0	45 39.5	9.31123	9.9496	3.49	4.84	18	1	25.9
19	9 16 56.32	17 14.02	17 25 19.7	24 0.7	9.30938	9.9592	3.48	4.83	19	1	26.8
20	9 21 40.29	22 7.10	17 3 15.3	1 53.8	9.30754	9.9683	3.48	4.82	20	1	27.7
21	9 26 41.01	26 58.94	16 40 43.5	39 19.4	9.30564	9.9770	3.48	4.81	21	1	28.7
22	9 31 31.47	31 49.51	16 17 44.9	16 18.3	9.30380	9.9852	3.47	4.80	22	1	29.6
23	9 36 20.70	36 38.84	15 54 20.3	52 51.2	9.30194	9.9933	3.47	4.79	23	1	30.5
24	9 41 8.71	41 26.95	15 30 30.3	28 58.7	9.30014	9.0007	3.46	4.77	24	1	31.4
25	9 45 55.53	46 13.86	15 6 15.8	4 41.9	9.29836	0.0082	3.46	4.77	25	1	32.2
26	9 50 41.17	50 59.58	14 41 37.2	40 1.1	9.29652	0.0149	3.46	4.74	26	1	33.0
27	9 55 25.64	55 44.13	14 16 35.6	14 57.1	9.29478	0.0216	3.44	4.74	27	1	33.8
28	10 0 8.97	0 27.55	13 51 11.4	49 30.6	9.29301	0.0279	3.44	4.72	28	1	34.6
29	10 4 51.16	5 9.82	13 25 25.5	23 42.4	9.29133	0.0339	3.42	4.71	29	1	35.4
30	10 9 32.27	9 51.00	12 59 18.5	57 33.2	9.28967	0.0396	3.41	4.69	30	1	36.1
31	10 14 12.31	14 31.10	12 32 51.4	31 4.0	9.28804	0.0451	3.40	4.67	31	1	36.8
Aug. 1	10 18 51.31	19 10.15	12 6 4.5	4 15.3	9.28645	0.0502	3.39	4.65	1	1	37.5
2	10 23 29.29	23 48.20	11 38 59.0	37 7.7	9.28481	0.0551	3.39	4.64	2	1	38.2
3	10 28 6.26	28 25.24	11 11 35.3	9 41.8	9.28330	0.0599	3.38	4.63	3	1	38.9
4	10 32 42.26	33 1.30	10 43 54.0	41 58.6	9.28170	0.0644	3.37	4.61	4	1	39.5
5	10 37 17.32	37 36.41	10 15 56.0	13 58.8	9.28025	0.0686	3.34	4.58	5	1	40.1
6	10 41 51.48	42 10.63	9 47 42.0	45 42.9	9.27894	0.0727	3.33	4.57	6	1	40.8
7	10 46 24.77	46 44.00	9 19 12.8	17 11.9	9.27755	0.0763	3.32	4.54	7	1	41.4
8	10 50 57.21	51 16.50	8 50 29.3	48 26.7	9.27624	0.0799	3.29	4.52	8	1	42.0
9	10 55 28.85	55 48.18	8 21 32.1	19 27.8	9.27496	0.0832	3.28	4.49	9	1	42.6
10	10 59 59.71	0 19.09	7 52 21.9	50 16.0	9.27376	0.0864	3.26	4.48	10	1	43.2
11	11 4 29.81	4 49.23	7 22 59.3	20 51.9	9.27252	0.0893	3.25	4.45	11	1	43.7
12	11 8 59.18	0 18.65	6 53 25.0	51 16.2	9.27141	0.0921	3.22	4.42	12	1	44.2
13	11 13 27.88	13 47.41	6 23 39.8	21 29.7	9.27039	0.0946	3.18	4.38	13	1	44.8
14	11 17 55.96	18 15.54	5 53 44.6	51 33.0	9.26932	0.0970	3.16	4.36	14	1	45.3
15	11 22 23.41	22 43.05	5 23 40.0	21 27.1	9.26836	0.0991	3.14	4.33	15	1	45.8
16	11 26 50.27	27 9.97	4 53 26.6	51 12.3	9.26748	0.1012	3.10	4.30	16	1	46.3
17	11 31 16.69	31 36.34	4 23 5.0	20 49.6	9.26659	0.1030	3.09	4.24	17	1	46.8
18	11 35 42.44	36 2.23	3 52 36.2	50 19.7	9.26587	0.1047	3.02	4.20	18	1	47.3
19	11 40 7.84	40 27.69	3 22 0.8	19 43.2	9.26520	0.1061	2.99	4.15	19	1	47.8
20	11 44 32.84	44 52.75	2 51 19.6	49 0.9	9.26453	0.1075	2.97	4.10	20	1	48.3
21	11 48 57.45	49 17.43	2 20 33.3	18 13.6	9.26390	0.1085	2.91	4.01	21	1	48.8
22	11 53 21.72	53 41.76	1 49 42.6	47 21.9	9.26344	0.1095	2.81	3.90	22	1	49.2
23	11 57 45.71	58 5.82	1 18 47.9	16 26.4	9.26298	0.1104	2.78	3.89	23	1	49.7
24	12 2 9.47	2 29.65	0 47 50.1	45 27.8	9.26263	0.1109	2.66	3.78	24	1	50.2
25	12 6 33.03	6 53.28	+ 0 16 50.0	14 26.9	9.26239	0.1115	2.53	3.64	25	1	50.7
26	12 10 56.46	11 16.76	- 0 14 11.9	16 35.5	9.26214	0.1118	2.40	3.38	26	1	51.0
27	12 15 19.76	15 40.14	0 45 14.8	47 39.1	9.26198	0.1119	2.23	2.99	27	1	51.5
28	12 19 42.99	20 3.47	1 16 18.1	18 43.1	9.26194	0.1120	-1.38	-2.63	28	1	52.0
29	12 24 6.21	24 26.76	1 47 21.2	49 46.6	9.26196	0.1118	+2.16	+3.38	29	1	52.4
30	12 28 29.46	28 50.08	2 18 23.3	20 49.1	9.26206	0.1116	2.40	3.59	30	1	52.8
31	12 32 52.76	33 13.47	- 2 49 23.8	51 50.0	+9.26209	-0.1110	+2.53	+3.76	31	1	53.3

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
Sept. 1	h m s	m s	° ' "	' "					d h m
	12 37 16.15	37 36.95	— 3 20' 22.0	22' 48.5	+9.26234	—0.1105	+2.61	+3.83	1 1 53.7
	12 41 39.70	42 0.59	3 51 17.2	53 44.1	9.26265	0.1097	2.68	3.96	2 1 54.1
	12 46 3.45	46 24.45	4 22 8.7	24 35.9	9.26300	0.1087	2.75	4.01	3 1 54.6
	12 50 27.43	50 48.54	4 52 55.6	55 23.0	9.26339	0.1075	2.80	4.10	4 1 55.1
	12 54 51.67	55 12.88	5 23 37.2	26 4.7	9.26389	0.1062	2.87	4.15	5 1 55.5
	12 59 16.22	59 37.54	5 54 12.8	56 40.4	9.26438	0.1047	2.90	4.20	6 1 56.0
	13 3 41.11	4 2.55	6 24 41.9	27 9.6	9.26498	0.1031	2.96	4.24	7 1 56.5
	13 8 6.38	8 27.95	6 55 3.7	57 31.5	9.26564	0.1014	3.01	4.28	8 1 57.0
	13 12 32.07	12 53.76	7 25 17.6	27 45.3	9.26637	0.0993	3.05	4.34	9 1 57.5
	13 16 58.22	17 20.04	7 55 22.7	57 50.2	9.26716	0.0971	3.07	4.36	10 1 58.0
	13 21 24.86	21 46.80	8 25 18.2	27 45.4	9.26793	0.0946	3.08	4.30	11 1 58.4
	13 25 52.01	26 14.08	8 55 3.4	57 30.4	9.26885	0.0921	3.12	4.42	12 1 58.9
	13 30 19.73	30 41.95	9 24 37.8	27 4.4	9.26976	0.0894	3.15	4.45	13 1 59.4
	13 34 48.04	35 10.41	9 54 0.6	56 27.0	9.27075	0.0864	3.18	4.48	14 1 59.9
	13 39 16.97	39 39.50	10 23 10.9	25 36.8	9.27178	0.0832	3.20	4.50	15 2 0.5
	13 43 46.56	44 9.26	10 52 8.0	54 33.4	9.27293	0.0798	3.23	4.53	16 2 1.1
	13 48 16.84	48 39.74	11 20 51.1	23 16.0	9.27400	0.0763	3.25	4.54	17 2 1.7
	13 52 47.85	53 10.90	11 49 19.7	51 44.1	9.27520	0.0725	3.27	4.57	18 2 2.3
	13 57 19.61	57 42.82	12 17 33.1	19 56.7	9.27642	0.0683	3.28	4.59	19 2 2.8
	14 1 52.15	2 15.54	12 45 30.3	47 53.1	9.27774	0.0642	3.30	4.60	20 2 3.4
	14 6 25.51	6 49.09	13 13 10.7	15 32.7	9.27901	0.0596	3.31	4.63	21 2 4.0
	14 10 59.73	11 23.50	13 40 33.5	42 54.8	9.28039	0.0549	3.33	4.64	22 2 4.6
	14 15 34.82	15 58.80	14 7 38.1	9 58.6	9.28184	0.0500	3.35	4.66	23 2 5.3
	14 20 10.83	20 35.02	14 34 23.8	36 43.3	9.28329	0.0447	3.35	4.68	24 2 6.0
	14 24 47.77	25 12.18	15 0 49.7	3 8.2	9.28475	0.0392	3.36	4.69	25 2 6.7
	14 29 25.66	29 50.29	15 26 55.2	29 12.7	9.28629	0.0335	3.38	4.70	26 2 7.4
	14 34 4.54	34 29.37	15 52 39.7	54 55.9	9.28780	0.0274	3.38	4.72	27 2 8.0
	14 38 44.42	39 9.46	16 18 2.1	20 17.0	9.28937	0.0211	3.39	4.73	28 2 8.7
	14 43 25.31	43 50.58	16 43 2.0	45 15.6	9.29100	0.0145	3.40	4.75	29 2 9.4
	14 48 7.25	48 32.78	17 7 38.6	9 50.9	9.29263	0.0074	3.40	4.77	30 2 10.2
Oct. 1	14 52 50.25	53 16.06	17 31 51.1	34 2.0	9.29430	0.0002	3.42	4.77	1 2 11.1
	14 57 34.34	58 0.39	17 55 38.8	57 48.3	9.29587	9.9925	3.42	4.79	2 2 11.9
	15 2 19.48	2 45.80	18 19 1.0	21 8.9	9.29747	9.9845	3.42	4.80	3 2 12.7
	15 7 5.68	7 32.26	18 41 57.0	44 3.2	9.29914	9.9760	3.42	4.81	4 2 13.5
	15 11 52.98	12 19.83	19 4 25.8	6 30.3	9.30083	9.9673	3.41	4.82	5 2 14.3
	15 16 41.39	17 8.51	19 26 27.0	28 29.7	9.30243	9.9580	3.41	4.84	6 2 15.2
	15 21 30.85	21 58.26	19 47 59.8	50 0.5	9.30404	9.9483	3.41	4.85	7 2 16.1
	15 26 21.38	26 49.08	20 9 3.3	11 2.0	9.30565	9.9381	3.41	4.86	8 2 17.0
	15 31 12.99	31 40.99	20 29 36.9	31 33.6	9.30722	9.9275	3.40	4.87	9 2 18.0
	15 36 5.65	36 33.93	20 49 40.0	51 34.5	9.30877	9.9164	3.40	4.88	10 2 18.9
	15 40 59.35	41 27.92	21 9 11.8	11 3.8	9.31034	9.9042	3.40	4.89	11 2 19.8
	15 45 54.09	46 22.94	21 28 11.4	30 1.0	9.31183	9.8923	3.38	4.89	12 2 20.7
	15 50 49.83	51 18.98	21 46 38.5	48 25.7	9.31331	9.8795	3.38	4.90	13 2 21.7
	15 55 46.56	56 16.01	22 4 32.4	6 17.0	9.31469	9.8657	3.36	4.92	14 2 22.7
	16 0 44.24	1 14.00	22 21 52.2	23 34.0	9.31613	9.8513	3.37	4.92	15 2 23.7
	16 5 42.87	6 12.93	22 38 37.2	40 16.3	9.31744	9.8363	3.33	4.93	16 2 24.7
	16 10 42.40	11 12.77	22 54 47.1	56 23.3	9.31870	9.8205	3.32	4.93	17 2 25.8
	16 15 42.79	16 13.48	23 10 21.3	11 54.5	9.32000	9.8035	3.30	4.95	18 2 26.9
	16 20 44.05	21 15.05	23 25 19.1	26 49.1	9.32119	9.7861	3.28	4.95	19 2 28.0
	16 25 46.10	26 17.41	23 39 39.8	41 6.7	9.32226	9.7670	3.26	4.96	20 2 29.1
	16 30 48.91	31 20.54	23 53 23.0	54 46.7	9.32338	9.7471	3.24	4.96	21 2 30.2
	16 35 52.45	36 24.39	24 6 28.1	7 48.4	9.32437	9.7259	3.22	4.97	22 2 31.3
	16 40 56.69	41 28.93	24 18 54.7	20 11.5	9.32537	9.7034	3.21	4.97	23 2 32.4
	16 46 1.60	46 34.13	24 30 42.4	31 55.6	9.32628	9.6793	3.16	4.98	24 2 33.5
	16 51 7.10	51 39.95	24 41 50.7	43 0.2	9.32705	9.6537	3.11	4.98	25 2 34.7
	16 56 13.12	56 46.28	24 52 19.3	53 25.0	9.32780	9.6261	3.08	4.99	26 2 35.9
	17 1 19.64	1 53.11	25 2 7.7	3 9.5	9.32846	9.5959	3.03	4.99	27 2 37.1
	17 6 26.61	7 0.37	25 11 15.4	12 13.1	9.32903	9.5639	2.95	4.99	28 2 38.3
	17 11 33.95	12 8.01	25 19 42.2	20 35.8	9.32954	9.5288	2.90	5.00	29 2 39.4
	17 16 41.62	17 15.95	25 27 27.9	28 17.2	9.32997	9.4895	2.80	5.00	30 2 40.6
	17 21 49.55	22 24.16	25 34 32.0	35 16.9	9.33026	9.4469	2.64	5.00	31 2 41.8
	17 26 57.66	27 32.56	—25 40 54.4	41 35.0	+9.33047	—9.4004	+2.46	+5.00	32 2 43.0

## FOR WASHINGTON MEAN NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Mean Noon.	At Transit.	At Mean Noon.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
Nov. 1	h m s	m s	° ′ ″	° ′ ″					d h m
2	17 26 57.66	27 32.56	25 40 54.4	41 35.0	+9.33047	-9.4004	+2.46	+5.00	1 2 43.0
3	17 32 5.89	32 41.07	25 46 35.1	47 11.3	9.33061	9.3456	+2.16	5.01	2 2 44.3
4	17 37 14.18	37 49.62	25 51 33.2	52 4.9	9.33066	9.2838	-1.86	5.01	3 2 45.5
5	17 42 22.44	42 58.12	25 55 48.9	56 15.8	9.33050	9.2123	2.46	5.01	4 2 46.7
6	17 47 30.58	48 6.49	25 59 22.4	59 44.4	9.33030	9.1254	2.66	5.01	5 2 47.8
7	17 52 38.53	53 14.66	26 2 13.3	2 30.5	9.32998	9.0163	2.81	5.01	6 2 49.0
8	17 57 46.21	58 22.56	26 4 21.6	4 34.0	9.32954	8.8718	2.93	5.01	7 2 50.2
9	18 2 53.54	3 30.10	26 5 47.4	5 54.7	9.32900	8.6492	3.02	5.01	8 2 51.4
10	18 8 0.44	8 37.20	26 6 30.4	6 32.7	9.32833	-8.1801	3.10	5.01	9 2 52.6
11	18 13 6.82	13 43.75	26 6 31.0	6 28.2	9.32752	+8.1679	3.17	5.01	10 2 53.7
12	18 18 12.59	18 49.67	26 5 48.9	5 41.0	9.32662	8.6424	3.22	5.01	11 2 54.8
13	18 23 17.67	23 54.90	26 4 24.6	4 11.4	9.32556	8.8644	3.28	5.01	12 2 55.9
14	18 28 21.98	28 59.35	26 2 18.0	1 59.5	9.32439	9.0113	3.32	5.01	13 2 57.1
15	18 33 25.42	34 2.91	25 59 29.3	59 5.5	9.32310	9.1204	3.36	5.00	14 2 58.2
16	18 38 27.92	39 5.51	25 55 58.8	55 29.7	9.32171	9.2056	3.39	5.00	15 2 59.3
17	18 43 29.40	44 7.08	25 51 46.8	51 12.4	9.32021	9.2771	3.41	5.00	16 3 0.3
18	18 48 29.80	49 7.56	25 46 53.6	46 13.8	9.31853	9.3380	3.46	5.00	17 3 1.4
19	18 53 29.03	54 6.86	25 41 19.6	40 34.4	9.31679	9.3911	3.48	4.99	18 3 2.5
20	18 58 27.01	59 4.89	25 35 5.1	34 14.5	9.31492	9.4382	3.50	4.99	19 3 3.5
21	19 3 23.66	4 1.57	25 28 10.3	27 14.3	9.31290	9.4800	3.53	4.98	20 3 4.5
22	19 8 18.91	8 56.85	25 20 35.9	19 34.5	9.31081	9.5174	3.55	4.98	21 3 5.5
23	19 13 12.70	13 50.64	25 12 22.2	11 15.4	9.30857	9.5520	3.57	4.98	22 3 6.5
24	19 18 4.95	18 42.88	25 3 20.8	2 17.7	9.30628	9.5834	3.58	4.97	23 3 7.4
25	19 22 55.61	23 33.50	24 53 59.2	52 41.8	9.30380	9.6123	3.61	4.96	24 3 8.3
26	19 27 44.59	28 22.43	24 43 50.8	42 28.0	9.30126	9.6393	3.62	4.96	25 3 9.2
27	19 32 31.84	33 9.61	24 33 5.2	31 37.1	9.29863	9.6640	3.63	4.94	26 3 10.0
28	19 37 17.32	37 55.01	24 21 42.9	20 9.8	9.29584	9.6870	3.65	4.94	27 3 10.8
29	19 42 0.93	42 38.52	24 9 45.0	8 6.8	9.29293	9.7085	3.67	4.93	28 3 11.6
30	19 46 42.63	47 20.10	23 57 11.8	55 28.5	9.28996	9.7287	3.68	4.92	29 3 12.3
31	19 51 22.36	51 59.70	23 44 3.8	42 15.5	9.28684	9.7477	3.69	4.91	30 3 13.0
Dec. 1	19 56 0.05	56 37.25	23 30 21.9	28 28.8	9.28360	9.7654	3.71	4.90	1 3 13.7
2	20 0 35.64	1 12.68	23 16 6.8	14 8.8	9.28023	9.7819	3.72	4.89	2 3 14.4
3	20 5 9.07	5 45.94	23 1 19.2	59 16.5	9.27675	9.7977	3.73	4.89	3 3 15.0
4	20 9 40.29	10 16.96	22 45 59.7	43 52.3	9.27313	9.8127	3.75	4.87	4 3 15.6
5	20 14 9.21	14 45.66	22 30 9.3	27 57.4	9.26940	9.8266	3.75	4.86	5 3 16.1
6	20 18 35.80	19 12.01	22 13 48.7	11 32.5	9.26554	9.8398	3.77	4.85	6 3 16.6
7	20 22 59.98	23 35.96	21 56 58.8	54 38.3	9.26158	9.8522	3.77	4.84	7 3 17.1
8	20 27 21.72	27 57.43	21 39 40.4	37 15.7	9.25748	9.8640	3.78	4.83	8 3 17.5
9	20 31 40.94	32 16.36	21 21 54.2	19 25.6	9.25321	9.8751	3.79	4.81	9 3 17.8
10	20 35 57.59	36 32.70	21 3 41.2	1 8.7	9.24878	9.8856	3.81	4.80	10 3 18.2
11	20 40 11.60	40 46.39	20 45 2.1	42 25.9	9.24421	9.8955	3.81	4.78	11 3 18.4
12	20 44 22.93	44 57.37	20 25 58.0	23 18.3	9.23951	9.9048	3.82	4.76	12 3 18.6
13	20 48 31.50	49 5.59	20 6 29.9	3 46.8	9.23471	9.9135	3.83	4.75	13 3 18.8
14	20 52 37.28	53 11.02	19 46 38.6	43 52.1	9.22972	9.9220	3.84	4.74	14 3 19.0
15	20 56 40.22	57 13.58	19 26 24.8	23 35.1	9.22458	9.9300	3.85	4.71	15 3 19.1
16	21 0 40.26	1 13.23	19 5 49.4	2 56.9	9.21931	9.9371	3.85	4.69	16 3 19.2
17	21 4 37.36	5 9.91	18 44 53.7	41 58.5	9.21385	9.9441	3.86	4.68	17 3 19.1
18	21 8 31.45	9 3.57	18 23 38.7	20 40.9	9.20827	9.9505	3.87	4.65	18 3 19.0
19	21 12 22.50	12 54.18	18 2 5.0	59 4.8	9.20250	9.9567	3.87	4.63	19 3 18.9
20	21 16 10.45	16 41.66	17 40 13.7	37 11.4	9.19652	9.9623	3.88	4.60	20 3 18.7
21	21 19 55.24	20 25.98	17 18 6.0	15 1.7	9.19039	9.9675	3.89	4.58	21 3 18.5
22	21 23 36.84	24 7.10	16 55 42.5	52 36.4	9.18402	9.9723	3.90	4.54	22 3 18.3
23	21 27 15.16	27 44.93	16 33 4.4	29 56.6	9.17752	9.9769	3.90	4.52	23 3 18.0
24	21 30 50.19	31 19.46	16 10 12.7	7 3.4	9.17079	9.9812	3.91	4.48	24 3 17.7
25	21 34 21.86	34 50.60	15 47 8.5	43 58.0	9.16382	9.9848	3.92	4.43	25 3 17.3
26	21 37 50.11	38 18.31	15 23 52.6	20 41.1	9.15664	9.9883	3.92	4.41	26 3 16.8
27	21 41 14.89	41 42.53	15 0 26.2	57 13.8	9.14918	9.9914	3.94	4.37	27 3 16.3
28	21 44 36.10	45 3.17	14 36 50.2	33 37.1	9.14141	9.9941	3.94	4.30	28 3 15.7
29	21 47 53.69	48 20.16	14 13 5.8	9 52.3	9.13339	9.9965	3.95	4.24	29 3 15.0
30	21 51 7.59	51 33.45	13 49 14.2	46 0.6	9.12508	9.9985	3.96	4.19	30 3 14.3
31	21 54 17.71	54 42.99	-13 25 16.1	22 2.3	+9.11652	+0.0004	-3.97	+4.17	31 3 13.6

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
Jan. 0.2	d h m s	m s	+12° 59' 28.0"	59 56.6	+7.98183	+8.6358	-3.82	+4.59	d h m
1.2	10 31 22.29	31 28.09	13 0 38.1	1 14.2	7.88382	8.7368	3.83	4.60	0 15 47.2
2.2	10 31 34.74	31 39.29	13 2 5.2	2 48.5	7.75466	8.8200	3.83	4.60	1 15 43.5
3.2	10 31 44.33	31 47.65	13 3 48.7	4 39.6	7.56918	8.8897	3.84	4.60	2 15 39.7
4.2	10 31 51.08	31 53.14	13 5 48.7	6 46.7	+7.23081	8.9502	3.85	4.61	3 15 35.9
5.2	10 31 54.97	31 55.76	13 8 5.5	9 10.9	-6.52738	9.0038	3.85	4.61	4 15 32.0
6.2	10 31 55.97	31 55.47	13 10 39.2	11 52.0	7.37946	9.0516	3.85	4.61	5 15 28.1
7.2	10 31 54.01	31 52.21	13 13 29.8	14 50.1	7.65120	9.0949	3.86	4.62	6 15 24.1
8.2	10 31 49.06	31 45.94	13 16 37.5	18 5.2	7.81913	9.1343	3.87	4.61	7 15 20.0
9.2	10 31 41.09	31 36.64	13 20 2.2	21 37.2	7.94115	9.1702	3.87	4.61	8 15 16.0
10.2	10 31 30.06	31 24.25	13 23 43.7	25 26.1	8.03662	9.2033	3.87	4.61	9 15 11.8
11.2	10 31 15.92	31 8.75	13 27 42.1	29 31.9	8.11580	9.2341	3.88	4.61	10 15 7.6
12.2	10 30 58.68	30 50.15	13 31 57.4	33 54.3	8.18248	9.2624	3.88	4.60	11 15 3.3
13.2	10 30 38.32	30 28.42	13 36 29.1	38 33.1	8.24036	9.2886	3.88	4.59	12 14 59.1
14.2	10 30 14.84	30 3.58	13 41 17.1	43 28.1	8.29151	9.3132	3.88	4.59	13 14 54.8
15.2	10 29 48.23	29 35.61	13 46 21.3	48 39.1	8.33725	9.3360	3.88	4.58	14 14 50.4
16.2	10 29 18.49	29 4.51	13 51 41.3	54 5.8	8.37858	9.3572	3.87	4.57	15 14 45.9
17.2	10 28 45.62	28 30.29	13 57 16.7	59 47.7	8.41506	9.3769	3.87	4.56	16 14 41.4
18.2	10 28 9.64	27 52.99	14 3 7.1	5 44.4	8.45027	9.3953	3.87	4.55	17 14 36.9
19.2	10 27 30.57	27 12.59	14 9 12.3	11 55.6	8.48197	9.4124	3.87	4.53	18 14 32.3
20.2	10 26 48.42	26 29.13	14 15 31.5	18 20.7	8.51124	9.4284	3.86	4.52	19 14 27.6
21.2	10 26 3.20	25 42.61	14 22 4.4	24 59.0	8.53839	9.4432	3.86	4.50	20 14 22.9
22.2	10 25 14.96	24 53.09	14 28 50.3	31 50.1	8.56341	9.4568	3.85	4.48	21 14 18.1
23.2	10 24 23.73	24 0.62	14 35 48.7	38 53.4	8.58675	9.4695	3.84	4.46	22 14 13.3
24.2	10 23 29.57	23 5.24	14 42 59.0	46 8.4	8.60857	9.4812	3.83	4.43	23 14 8.5
25.2	10 22 32.53	22 7.00	14 50 20.6	53 34.3	8.62889	9.4919	3.83	4.40	24 14 3.6
26.1	10 21 32.66	21 5.97	14 57 52.5	61 10.2	8.64802	9.5016	3.82	4.37	25 13 58.6
27.1	10 20 30.00	20 2.18	15 5 34.1	8 55.3	8.66589	9.5104	3.81	4.33	26 13 53.6
28.1	10 19 24.62	18 55.70	15 13 24.8	16 49.2	8.68256	9.5181	3.79	4.29	27 13 48.6
29.1	10 18 16.59	17 46.62	15 21 23.4	24 50.7	8.69814	9.5251	3.78	4.25	28 13 43.5
30.1	10 17 5.98	16 34.99	15 29 29.4	32 59.2	8.71260	9.5313	3.76	4.19	29 13 38.4
31.1	10 15 52.89	15 20.92	15 37 41.9	41 13.6	8.72601	9.5365	3.73	4.11	30 13 33.2
Feb. 1.1	10 14 37.42	14 4.53	15 45 59.7	49 33.0	8.73839	9.5409	3.71	4.04	31 13 28.0
2.1	10 13 19.68	12 45.93	15 54 22.1	57 56.5	8.74985	9.5443	3.69	3.93	1 13 22.8
3.1	10 11 59.77	11 25.22	16 2 48.0	6 23.1	8.76042	9.5468	3.67	3.74	2 13 17.5
4.1	10 10 37.81	10 2.50	16 11 16.3	14 51.5	8.77011	9.5483	3.64	3.46	3 13 12.2
5.1	10 9 13.92	8 37.92	16 19 45.7	23 20.7	8.77894	9.5489	3.61	+2.86	4 13 6.9
6.1	10 7 48.22	7 11.59	16 28 15.5	31 49.7	8.78684	9.5487	3.57	-3.34	5 13 1.5
7.1	10 6 20.85	5 43.63	16 36 44.3	40 17.3	8.79370	9.5475	3.50	3.68	6 12 56.1
8.1	10 4 51.98	4 14.27	16 45 11.1	48 42.5	8.79949	9.5454	3.43	3.84	7 12 50.7
9.1	10 3 21.80	2 43.69	16 53 35.1	57 4.4	8.80437	9.5423	3.36	3.99	8 12 45.3
10.1	10 1 50.51	1 12.08	17 1 55.0	5 21.6	8.80845	9.5383	3.26	4.10	9 12 39.8
11.1	9 58 18.27	59 39.61	17 10 9.6	13 33.2	8.81176	9.5332	3.17	4.18	10 12 34.3
12.1	9 58 45.25	58 6.42	17 18 17.9	21 38.2	8.81441	9.5272	3.04	4.25	11 12 28.9
13.1	9 57 11.58	56 32.64	17 26 18.7	29 35.1	8.81610	9.5200	2.80	4.31	12 12 23.4
14.1	9 55 37.45	54 58.49	17 34 11.1	37 23.2	8.81672	9.5118	-1.98	4.35	13 12 17.9
15.1	9 54 3.08	53 24.17	17 41 54.2	45 1.7	8.81646	9.5027	+2.50	4.39	14 12 12.4
16.1	9 52 28.67	51 49.89	17 49 27.2	52 29.8	8.81537	9.4927	2.90	4.42	15 12 6.9
17.1	9 50 54.40	50 15.84	17 56 49.3	59 46.7	8.81345	9.4814	3.08	4.46	16 12 1.4
18.1	9 49 20.46	48 42.19	18 3 59.4	6 51.3	8.81068	9.4690	3.22	4.48	17 11 55.9
19.1	9 47 47.02	47 9.11	18 10 57.0	13 43.0	8.80706	9.4555	3.32	4.51	18 11 50.4
20.1	9 46 14.27	45 36.78	18 17 41.2	20 21.1	8.80259	9.4408	3.39	4.53	19 11 45.0
21.1	9 44 42.30	44 5.40	18 24 11.4	26 45.2	8.79728	9.4248	3.46	4.55	20 11 39.5
22.1	9 43 11.53	42 35.10	18 30 27.0	32 54.5	8.79106	9.4077	3.52	4.56	21 11 34.1
23.1	9 41 41.86	41 6.06	18 36 27.8	38 48.7	8.78402	9.3894	3.56	4.57	22 11 28.7
24.1	9 40 13.56	39 38.43	18 42 13.1	44 27.2	8.77617	9.3697	3.60	4.58	23 11 23.3
25.1	9 38 46.75	38 12.35	18 47 42.5	49 49.8	8.76736	9.3484	3.64	4.59	24 11 17.9
26.1	9 37 21.58	36 47.96	18 52 55.6	54 56.2	8.75765	9.3257	3.67	4.59	25 11 12.6
27.1	9 35 58.21	35 25.42	18 57 52.3	59 46.0	8.74711	9.3017	3.69	4.60	26 11 7.3
28.1	9 34 36.77	34 4.86	19 2 32.4	4 19.2	8.73554	9.2757	3.72	4.61	27 11 2.0
29.1	9 33 17.37	32 46.38	19 6 55.6	8 35.3	8.72300	9.2475	3.74	4.62	28 10 56.8
30.1	9 32 0.15	31 30.13	+19 11 1.6	12 34.3	-8.70952	+9.2171	+3.76	-4.62	29 10 51.6
31.1	9 30 45.21	30 16.18							30 10 46.4

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
Mar. 1.1	d h m s	m s	° ' " "	' " "					d h m
1.1	9 32 0.15	31 30.13	+19 6 55.6	8 35.3	-8.72300	+9.2475	+3.74	-4.62	1 10 51.6
2.1	9 30 45.21	30 16.18	19 11 1.6	12 34.3	8.70952	9.2171	3.76	4.62	2 10 46.4
3.1	9 29 32.63	29 4.62	19 14 50.4	16 16.0	8.69503	9.1844	3.77	4.62	3 10 41.3
4.0	9 28 22.54	27 5.60	19 18 21.9	19 40.4	8.67935	9.1486	3.79	4.63	4 10 36.2
5.0	9 27 15.03	26 49.18	19 21 35.9	22 47.5	8.66240	9.1096	3.81	4.62	5 10 31.2
6.0	9 26 10.19	25 45.47	19 24 32.6	25 37.4	8.64421	9.0672	3.82	4.62	6 10 26.2
7.0	9 25 8.11	24 44.53	19 27 12.1	28 10.0	8.62465	9.0203	3.83	4.62	7 10 21.2
8.0	9 24 8.86	23 46.45	19 29 34.5	30 25.6	8.60364	8.9679	3.84	4.62	8 10 16.3
9.0	9 23 12.52	22 51.30	19 31 39.7	32 24.0	8.58105	8.9083	3.85	4.62	9 10 11.5
10.0	9 22 19.13	21 59.11	19 33 27.8	34 5.4	8.55672	8.8399	3.86	4.61	10 10 6.7
11.0	9 21 28.75	21 9.94	19 34 59.0	35 30.0	8.53059	8.7599	3.87	4.60	11 10 1.9
12.0	9 20 41.43	20 23.84	19 36 13.5	36 38.0	8.50246	8.6622	3.87	4.60	12 9 57.2
13.0	9 19 57.18	19 40.83	19 37 11.4	37 29.5	8.47192	8.5380	3.88	4.59	13 9 52.6
14.0	9 19 16.07	19 0.96	19 37 53.0	38 4.8	8.43863	8.3667	3.88	4.59	14 9 48.0
15.0	9 18 38.11	18 24.25	19 38 18.4	38 24.0	8.40244	8.0847	3.88	4.58	15 9 43.5
16.0	9 18 3.32	17 50.69	19 38 28.0	38 27.6	8.36285	+7.0969	3.88	4.57	16 9 39.0
17.0	9 17 31.70	17 20.31	19 38 22.0	38 15.6	8.31920	-7.9768	3.88	4.57	17 9 34.5
18.0	9 17 3.26	16 53.12	10 38 0.7	37 48.4	8.27050	8.3025	3.89	4.56	18 9 30.1
19.0	9 16 38.01	16 29.10	19 37 24.2	37 6.2	8.21575	8.4836	3.88	4.55	19 9 25.8
20.0	9 16 15.92	16 8.22	19 36 33.0	36 9.4	8.15403	8.6080	3.87	4.54	20 9 21.5
21.0	9 15 56.95	15 50.46	19 35 27.5	34 58.4	8.08294	8.7029	3.87	4.53	21 9 17.3
22.0	9 15 41.07	15 35.77	19 34 7.8	33 33.3	7.99804	8.7794	3.87	4.52	22 9 13.1
23.0	9 15 28.27	15 24.15	19 32 34.3	31 54.6	7.89337	8.8427	3.87	4.51	23 9 9.0
24.0	9 15 18.53	15 15.58	19 30 47.3	30 2.4	7.75651	8.8978	3.86	4.51	24 9 4.9
25.0	9 15 11.82	15 10.03	19 28 46.8	27 56.9	7.55889	8.9456	3.86	4.50	25 9 0.9
26.0	9 15 8.09	15 7.44	19 26 33.3	25 38.4	-7.19479	8.9875	3.85	4.49	26 8 56.9
27.0	9 15 7.30	15 7.78	19 24 7.1	23 7.4	+6.66446	9.0249	3.84	4.48	27 8 53.0
28.0	9 15 9.40	15 10.98	19 21 28.4	20 23.9	7.39064	9.0589	3.84	4.47	28 8 49.1
29.0	9 15 14.36	15 17.03	19 18 37.3	17 28.1	7.64612	9.0897	3.83	4.46	29 8 45.3
30.0	9 15 22.14	15 25.88	19 15 34.3	14 20.5	7.80401	9.1180	3.82	4.45	30 8 41.5
31.0	9 15 32.68	15 37.49	19 12 19.4	11 1.1	7.91828	9.1440	3.82	4.44	31 8 37.8
Apr. 1.0	9 15 45.98	15 51.83	19 8 53.1	7 30.4	8.00718	9.1680	3.81	4.44	1 8 34.1
2.0	9 16 1.95	16 8.83	19 5 15.5	3 48.4	8.07969	9.1902	3.81	4.43	2 8 30.4
3.0	9 16 20.57	16 28.46	18 61 26.8	59 55.3	8.14093	9.2113	3.80	4.43	3 8 26.8
4.0	9 16 41.78	16 50.68	18 57 27.0	55 51.3	8.19392	9.2312	3.79	4.42	4 8 23.3
5.0	9 17 5.57	17 15.45	18 53 16.4	51 36.6	8.24045	9.2497	3.78	4.41	5 8 19.7
6.0	9 17 31.87	17 42.73	18 48 55.2	47 11.1	8.28176	9.2673	3.78	4.41	6 8 16.3
7.0	9 18 0.66	18 12.47	18 44 23.4	42 35.3	8.31905	9.2840	3.77	4.39	7 8 12.8
8.0	9 18 31.89	18 44.64	18 39 41.4	37 49.2	8.35252	9.2996	3.76	4.39	8 8 9.4
9.0	9 19 5.50	19 19.19	18 34 49.3	32 53.1	8.38319	9.3145	3.75	4.38	9 8 6.1
9.9	9 19 41.46	19 56.07	18 29 47.2	27 47.0	8.41119	9.3289	3.74	4.38	10 8 2.8
10.9	9 20 19.72	20 35.23	18 24 35.2	22 31.2	8.43709	9.3425	3.74	4.36	11 7 59.5
11.9	9 21 0.24	21 16.63	18 19 13.6	17 5.7	8.46105	9.3553	3.72	4.36	12 7 56.2
12.9	9 21 42.96	22 0.22	18 13 42.5	11 30.6	8.48311	9.3678	3.71	4.36	13 7 53.0
13.9	9 22 27.83	22 45.95	18 8 1.9	5 46.2	8.50388	9.3798	3.71	4.35	14 7 49.9
14.9	9 23 14.84	23 33.80	17 62 12.0	59 52.5	8.52329	9.3913	3.69	4.35	15 7 46.7
15.9	9 24 3.90	24 23.69	17 56 12.9	53 49.7	8.54130	9.4022	3.69	4.33	16 7 43.6
16.9	9 24 54.98	25 15.56	17 50 4.9	47 38.0	8.55810	9.4127	3.67	4.33	17 7 40.5
17.9	9 25 48.00	26 9.38	17 43 48.0	41 17.4	8.57391	9.4229	3.67	4.33	18 7 37.5
18.9	9 26 42.94	27 5.10	17 37 22.4	34 48.2	8.58890	9.4327	3.65	4.33	19 7 34.5
19.9	9 27 39.76	28 2.68	17 30 48.0	28 10.2	8.60304	9.4421	3.64	4.31	20 7 31.5
20.9	9 28 38.39	29 2.04	17 24 5.3	21 23.8	8.61623	9.4512	3.63	4.31	21 7 28.6
21.9	9 29 38.77	30 3.14	17 17 14.1	14 29.0	8.62879	9.4601	3.62	4.31	22 7 25.7
22.0	9 30 40.89	31 5.96	17 10 14.5	7 25.9	8.64070	9.4686	3.60	4.29	23 7 22.8
23.9	9 31 44.67	32 0.45	17 3 6.8	0 14.6	8.65181	9.4769	3.59	4.29	24 7 19.9
24.9	9 32 50.06	33 16.54	16 55 51.0	52 55.4	8.66243	9.4848	3.58	4.28	25 7 17.1
25.9	9 33 57.04	34 24.20	16 48 27.3	45 28.2	8.67265	9.4926	3.58	4.28	26 7 14.3
26.9	9 35 5.57	35 33.38	16 40 55.7	37 53.0	8.68234	9.5002	3.56	4.28	27 7 11.5
27.9	9 36 15.61	36 44.08	16 33 16.2	30 9.9	8.69161	9.5076	3.56	4.27	28 7 8.7
28.9	9 37 27.14	37 56.26	16 25 28.9	22 19.2	8.70051	9.5148	3.54	4.27	29 7 6.0
29.9	9 38 40.10	39 9.84	16 17 33.9	14 20.7	8.70896	9.5218	3.53	4.27	30 7 3.3
30.9	9 39 54.47	40 24.83	+16 9 31.2	6 14.5	+8.71702	-9.5287	+3.52	-4.26	31 7 0.6



## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
May 1 <sup>d</sup>	h m s	m s	+15 61 21.0	58 08	+8.72473	-9.5353	+3.51	-4.26	d h m
29	9 41 10.20	41 41.17	15 53 3.3	49 39.6	8.73220	9.5419	3.50	4.26	2 6 57.9
39	9 43 45.63	44 17.81	15 44 38.1	41 11.0	8.73943	9.5483	3.49	4.25	4 6 52.7
49	9 45 5.30	45 38.06	15 36 5.4	39 35.0	8.74636	9.5545	3.48	4.25	5 6 50.1
59	9 46 26.22	46 59.57	15 27 25.6	23 51.6	8.75304	9.5606	3.48	4.25	6 6 47.5
69	9 47 48.38	48 22.28	15 18 38.5	15 1.0	8.75944	9.5666	3.45	4.25	7 6 45.0
79	9 49 11.72	49 46.19	15 9 44.0	6 3.0	8.76556	9.5725	3.45	4.24	8 6 42.4
89	9 50 36.24	51 11.26	14 60 42.3	56 57.7	8.77150	9.5783	3.44	4.24	9 6 39.9
99	9 52 1.89	52 37.47	14 51 33.5	47 45.6	8.77725	9.5839	3.44	4.23	10 6 37.4
109	9 53 28.67	54 4.79	14 42 17.6	38 26.3	8.78283	9.5894	3.42	4.23	11 6 34.9
119	9 54 56.55	55 33.20	14 32 54.7	28 59.9	8.78817	9.5948	3.41	4.23	12 6 32.5
129	9 56 25.49	57 2.67	14 23 24.8	19 26.6	8.79327	9.6000	3.40	4.22	13 6 30.0
139	9 57 55.46	58 33.17	14 13 48.1	9 46.3	8.79822	9.6052	3.39	4.22	14 6 27.6
149	9 59 26.45	60 4.65	13 64 4.5	59 59.3	8.80297	9.6103	3.37	4.21	15 6 25.2
158	10 0 58.41	1 37.10	13 54 14.1	50 5.5	8.80745	9.6152	3.36	4.21	16 6 22.8
168	10 2 31.31	3 10.51	13 44 17.0	40 4.9	8.81185	9.6201	3.36	4.20	17 6 20.4
178	10 4 5.15	4 44.84	13 34 13.3	29 57.8	8.81615	9.6248	3.34	4.20	18 6 18.0
188	10 5 39.91	6 20.07	13 24 3.0	19 44.1	8.82023	9.6295	3.32	4.20	19 6 15.7
198	10 7 15.53	7 56.15	13 13 46.1	9 23.8	8.82414	9.6340	3.31	4.19	20 6 13.4
208	10 8 52.00	9 33.08	12 63 22.9	58 57.2	8.82790	9.6385	3.30	4.19	21 6 11.0
218	10 10 29.29	11 10.83	12 52 53.3	48 24.2	8.83153	9.6428	3.29	4.18	22 6 8.7
228	10 12 7.39	12 49.38	12 42 17.5	37 45.0	8.83506	9.6471	3.27	4.18	23 6 6.4
238	10 13 46.27	14 28.70	12 31 35.4	26 59.6	8.83844	9.6513	3.27	4.17	24 6 4.2
248	10 15 25.92	16 8.79	12 20 47.2	16 7.9	8.84177	9.6554	3.26	4.17	25 6 1.9
258	10 17 6.33	17 49.62	12 9 52.9	5 10.3	8.84499	9.6594	3.24	4.17	26 5 59.6
268	10 18 47.45	19 31.18	11 58 52.5	54 6.6	8.84806	9.6634	3.24	4.15	27 5 57.4
278	10 20 29.30	21 13.44	11 47 46.2	42 57.0	8.85107	9.6672	3.22	4.15	28 5 55.2
288	10 22 11.84	22 56.41	11 36 34.1	31 41.4	8.85399	9.6711	3.22	4.15	29 5 52.9
298	10 23 55.07	24 40.06	11 25 15.9	20 19.9	8.85685	9.6748	3.21	4.15	30 5 50.7
308	10 25 38.97	26 24.38	11 13 51.9	8 52.6	8.85965	9.6785	3.21	4.14	31 5 48.5
318	10 27 23.54	28 9.35	10 62 22.2	57 10.5	8.86239	9.6821	3.19	4.14	32 5 46.3
June 1 <sup>st</sup>	10 29 8.76	29 54.98	10 50 46.7	45 40.6	8.86506	9.6857	3.19	4.14	2 5 44.2
2 <sup>nd</sup>	10 30 54.62	31 41.25	10 39 5.4	33 56.0	8.86766	9.6893	3.18	4.13	3 5 42.0
3 <sup>rd</sup>	10 32 41.11	33 28.16	10 27 18.5	22 5.8	8.87023	9.6927	3.18	4.13	4 5 39.8
4 <sup>th</sup>	10 34 28.23	35 15.68	10 15 26.0	10 9.9	8.87274	9.6961	3.17	4.13	5 5 37.7
5 <sup>th</sup>	10 36 15.96	37 3.82	9 63 27.9	58 8.4	8.87520	9.6994	3.17	4.13	6 5 35.6
6 <sup>th</sup>	10 38 4.30	38 52.56	9 51 24.3	46 1.5	8.87759	9.7028	3.15	4.11	7 5 33.4
7 <sup>th</sup>	10 39 53.23	40 41.89	9 39 15.3	33 49.2	8.87990	9.7060	3.15	4.11	8 5 31.3
8 <sup>th</sup>	10 41 42.73	42 31.78	9 27 0.9	21 31.5	8.88218	9.7091	3.14	4.11	9 5 29.2
9 <sup>th</sup>	10 43 32.80	44 22.24	9 14 41.2	9 8.5	8.88439	9.7122	3.12	4.10	10 5 27.1
10 <sup>th</sup>	10 45 23.42	46 13.25	8 62 16.3	56 40.3	8.88655	9.7152	3.12	4.10	11 5 25.0
11 <sup>th</sup>	10 47 14.59	48 4.81	8 49 46.2	44 6.9	8.88870	9.7183	3.12	4.10	12 5 23.0
12 <sup>th</sup>	10 49 6.31	49 56.91	8 37 10.9	31 28.3	8.89080	9.7212	3.11	4.09	13 5 20.9
13 <sup>th</sup>	10 50 58.56	51 49.53	8 24 30.5	18 44.7	8.89281	9.7241	3.09	4.07	14 5 18.8
14 <sup>th</sup>	10 52 51.32	53 42.67	8 11 45.2	5 56.2	8.89476	9.7268	3.08	4.06	15 5 16.8
15 <sup>th</sup>	10 54 44.58	55 36.31	7 58 55.1	53 2.9	8.89665	9.7295	3.07	4.06	16 5 14.7
16 <sup>th</sup>	10 56 38.33	57 30.42	7 46 0.2	40 4.7	8.89848	9.7322	3.05	4.06	17 5 12.7
17 <sup>th</sup>	10 58 32.55	59 25.02	7 33 0.4	27 1.8	8.90027	9.7349	3.05	4.04	18 5 10.7
18 <sup>th</sup>	11 0 27.24	1 20.09	7 19 56.1	13 54.3	8.90205	9.7374	3.05	4.04	19 5 8.7
19 <sup>th</sup>	11 2 22.40	3 15.62	7 6 47.2	0 42.3	8.90383	9.7399	3.05	4.04	20 5 6.6
20 <sup>th</sup>	11 4 18.03	5 11.60	6 53 33.8	47 25.9	8.90554	9.7423	3.03	4.03	21 5 4.6
21 <sup>st</sup>	11 6 14.10	7 8.03	6 40 16.0	34 5.0	8.90718	9.7447	3.03	4.02	22 5 2.6
22 <sup>nd</sup>	11 8 10.61	9 4.90	6 26 53.9	20 39.8	8.90882	9.7470	3.03	4.01	23 5 0.6
23 <sup>rd</sup>	11 10 7.56	11 2.91	6 13 27.5	7 10.4	8.91044	9.7493	3.02	4.01	24 4 58.7
24 <sup>th</sup>	11 12 4.94	12 52.94	5 59 57.0	53 36.8	8.91203	9.7516	3.02	4.00	25 4 56.7
25 <sup>th</sup>	11 14 2.75	14 58.11	5 46 22.3	39 59.1	8.91361	9.7537	3.02	3.98	26 4 54.7
26 <sup>th</sup>	11 16 0.99	16 56.73	5 32 43.6	26 17.3	8.91519	9.7558	3.02	3.98	27 4 52.8
27 <sup>th</sup>	11 17 59.66	18 55.78	5 19 0.9	12 31.7	8.91677	9.7579	3.02	3.97	28 4 50.8
28 <sup>th</sup>	11 19 58.76	20 55.26	4 65 14.4	58 42.1	8.91834	9.7600	3.02	3.97	29 4 48.9
29 <sup>th</sup>	11 21 58.29	22 55.14	4 51 23.9	44 48.6	8.91992	9.7620	3.02	3.96	30 4 46.9
30 <sup>th</sup>	11 23 58.25	24 55.47	4 37 29.6	30 51.4	8.92144	9.7639	3.01	3.96	31 4 45.0
31 <sup>st</sup>	11 25 58.63	26 56.22	+ 4 23 31.6	16 50.4	+8.92295	-9.7659	+3.01	-3.96	32 4 43.1

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
July <sup>d</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>	<sup>m</sup> <sup>s</sup>	<sup>+</sup> <sup>°</sup> <sup>'</sup> <sup>"</sup>	<sup>'</sup> <sup>"</sup>	<sup>+</sup>	<sup>-</sup>	<sup>+</sup>	<sup>-</sup>	<sup>d</sup> <sup>h</sup> <sup>m</sup>
1.7	11 25 58.63	26 56.22	+ 4 23 31.6	16 50.4	+8.92295	-9.7659	+3.01	-3.96	2 4 43.1
2.7	11 27 59.43	28 57.38	4 9 20.8	2 45.8	8.92446	9.7678	3.01	3.94	3 4 41.2
3.7	11 30 0.65	30 58.97	3 55 24.4	48 37.5	8.92595	9.7696	3.01	3.94	4 4 39.2
4.7	11 32 2.28	33 0.97	3 41 15.6	34 25.8	8.92743	9.7714	3.01	3.93	5 4 37.3
5.7	11 34 4.33	35 3.40	3 27 3.1	20 10.5	8.92892	9.7731	3.01	3.91	6 4 35.4
6.7	11 36 6.80	37 6.25	3 12 47.4	5 51.9	8.93043	9.7748	3.01	3.91	7 4 33.6
7.7	11 38 9.70	39 9.52	2 58 28.3	51 30.0	8.93190	9.7765	3.00	3.90	8 4 31.7
8.7	11 40 13.00	41 13.20	2 44 5.9	37 4.8	8.93334	9.7781	3.00	3.87	9 4 29.8
9.7	11 42 16.72	43 17.29	2 29 40.5	22 36.7	8.93480	9.7797	3.00	3.86	10 4 27.9
10.7	11 44 20.84	45 21.79	2 15 12.0	8 5.4	8.93623	9.7812	2.99	3.86	11 4 26.1
11.7	11 46 25.38	47 26.72	1 60 40.5	53 31.2	8.93766	9.7827	2.99	3.86	12 4 24.2
12.7	11 48 30.33	49 32.06	1 46 6.0	38 54.1	8.93907	9.7840	2.99	3.84	13 4 22.4
13.7	11 50 35.70	51 37.80	1 31 28.9	24 14.4	8.94047	9.7854	2.98	3.82	14 4 20.5
14.7	11 52 41.47	53 43.95	1 16 49.0	9 31.9	8.94186	9.7867	2.98	3.81	15 4 18.7
15.7	11 54 47.63	55 50.49	0 62 6.4	54 46.8	8.94322	9.7880	2.98	3.78	16 4 16.8
16.7	11 56 54.18	57 57.43	0 47 21.4	39 59.2	8.94459	9.7892	2.98	3.76	17 4 15.0
17.7	11 59 1.13	60 4.77	0 32 34.0	25 9.4	8.94596	9.7903	2.98	3.73	18 4 13.2
18.7	12 1 8.48	2 12.50	0 17 44.5	10 17.4	8.94732	9.7914	2.98	3.71	19 4 11.4
19.7	12 3 16.23	4 20.64	+ 0 2 52.6	- 4 36.8	8.94868	9.7924	2.98	3.69	20 4 9.6
20.7	12 5 24.39	6 29.19	- 0 12 1.2	19 32.9	8.95002	9.7934	2.97	3.68	21 4 7.8
21.7	12 7 32.93	8 38.12	0 26 57.1	34 31.1	8.95134	9.7944	2.97	3.66	22 4 6.0
22.7	12 9 41.86	10 47.44	0 41 54.9	49 31.3	8.95267	9.7953	2.98	3.65	23 4 4.2
23.7	12 11 51.19	12 57.17	0 56 54.6	64 33.2	8.95403	9.7961	2.98	3.61	24 4 2.5
24.7	12 14 0.93	15 7.32	1 11 55.9	19 36.7	8.95538	9.7969	2.99	3.59	25 4 0.7
25.7	12 16 11.07	17 17.88	1 26 58.9	34 41.9	8.95677	9.7977	3.01	3.57	26 3 58.9
26.7	12 18 21.64	19 28.86	1 42 3.5	49 48.5	8.95818	9.7984	3.01	3.54	27 3 57.2
27.6	12 20 32.63	21 40.25	1 57 9.5	64 56.7	8.95954	9.7991	3.01	3.52	28 3 55.4
28.6	12 22 44.02	23 52.06	2 12 16.8	20 6.1	8.96091	9.7998	3.01	3.51	29 3 53.7
29.6	12 24 55.84	26 4.31	2 27 25.7	35 17.0	8.96233	9.8004	3.02	3.42	30 3 52.0
30.6	12 27 8.08	28 16.98	2 42 35.5	50 28.7	8.96377	9.8009	3.03	3.40	31 3 50.2
31.6	12 29 20.77	30 30.09	2 57 46.4	65 41.5	8.96520	9.8014	3.03	3.38	32 3 48.5
Aug. 1.6	12 31 33.89	32 43.65	3 12 58.2	20 55.2	8.96663	9.8018	3.03	3.35	2 3 46.8
2.6	12 33 47.45	34 57.66	3 28 11.0	36 10.0	8.96808	9.8022	3.04	3.30	3 3 45.1
3.6	12 36 1.48	37 12.13	3 43 24.9	51 25.7	8.96955	9.8027	3.04	3.23	4 3 43.4
4.6	12 38 15.96	39 27.06	3 58 39.4	66 42.0	8.97098	9.8030	3.04	3.16	5 3 41.7
5.6	12 40 30.88	41 42.44	4 13 54.6	21 58.9	8.97249	9.8032	3.05	3.08	6 3 40.0
6.6	12 42 46.28	43 58.30	4 29 10.3	37 16.3	8.97398	9.8035	3.05	2.96	7 3 38.3
7.6	12 45 2.13	46 14.60	4 44 26.2	52 33.8	8.97545	9.8036	3.05	2.88	8 3 36.7
8.6	12 47 18.44	48 31.39	4 59 42.5	67 51.6	8.97693	9.8037	3.05	2.68	9 3 35.0
9.6	12 49 35.22	50 48.62	5 14 59.0	23 9.6	8.97838	9.8038	3.05	-2.38	10 3 33.4
10.6	12 51 52.44	53 6.31	5 30 15.6	38 27.6	8.97985	9.8038	3.06	+2.38	11 3 31.7
11.6	12 54 10.15	55 24.50	5 45 32.1	53 45.5	8.98135	9.8037	3.06	2.68	12 3 30.1
12.6	12 56 28.33	57 43.16	6 0 48.5	9 3.3	8.98284	9.8036	3.06	2.86	13 3 28.5
13.6	12 58 46.99	60 2.30	6 16 4.5	24 20.5	8.98434	9.8034	3.06	2.98	14 3 26.8
14.6	13 1 6.14	2 21.93	6 31 20.1	39 37.3	8.98584	9.8032	3.06	3.16	15 3 25.2
15.6	13 3 25.76	4 42.04	6 46 35.1	54 53.4	8.98732	9.8029	3.06	3.23	16 3 23.6
16.6	13 5 45.85	7 2.63	7 1 49.3	10 8.7	8.98881	9.8025	3.07	3.28	17 3 22.0
17.6	13 8 6.43	9 23.70	7 17 2.8	25 23.2	8.99032	9.8021	3.07	3.33	18 3 20.5
18.6	13 10 27.50	11 45.27	7 32 15.3	40 36.6	8.99183	9.8016	3.07	3.40	19 3 18.9
19.6	13 12 49.06	14 7.34	7 47 26.7	55 48.9	8.99335	9.8011	3.08	3.46	20 3 17.3
20.6	13 15 11.12	16 20.91	8 2 36.9	10 59.8	8.99488	9.8005	3.08	3.50	21 3 15.7
21.6	13 17 33.68	18 52.99	8 17 45.8	26 9.4	8.99641	9.7998	3.09	3.56	22 3 14.2
22.6	13 19 56.75	21 16.58	8 32 53.2	41 17.5	8.99796	9.7991	3.09	3.60	23 3 12.6
23.6	13 22 20.33	23 40.69	8 47 59.0	56 23.8	8.99952	9.7983	3.10	3.64	24 3 11.1
24.6	13 24 44.43	26 5.33	9 3 3.0	11 28.3	9.00112	9.7974	3.11	3.64	25 3 9.6
25.6	13 27 9.08	28 30.53	9 18 5.3	26 31.1	9.00274	9.7966	3.11	3.66	26 3 8.1
26.6	13 29 34.26	30 56.25	9 33 5.7	41 31.8	9.00435	9.7955	3.11	3.72	27 3 6.5
27.6	13 31 59.98	33 22.53	9 48 3.9	56 30.4	9.00596	9.7945	3.11	3.73	28 3 5.0
28.6	13 34 26.25	35 49.37	10 3 0.1	11 26.8	9.00760	9.7934	3.13	3.74	29 3 3.6
29.6	13 36 53.07	38 16.76	10 17 53.9	26 20.8	9.00927	9.7923	3.14	3.77	30 3 2.1
30.6	13 39 20.45	40 44.72	10 32 45.4	41 12.3	9.01095	9.7911	3.14	3.81	31 3 0.6
31.6	13 41 48.42	43 13.25	-10 47 34.2	56 1.1	+9.01262	-9.7898	+3.14	+3.81	32 2 59.1

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.		
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	d	h	m
Sept. 1.6	<sup>d</sup> 13 44 16.95	<sup>m</sup> 45 42.37	<sup>°</sup> 11 2 20.4	<sup>'</sup> 10 47.3	+9.01430	-9.7885	+3.15	+3.82	2	2	57.7
2.5	13 46 46.06	48 12.08	11 17 3.8	25 30.5	9.01599	9.7871	3.15	3.85	3	2	56.2
3.5	13 49 15.75	50 42.38	11 31 44.1	40 10.5	9.01770	9.7855	3.16	3.87	4	2	54.8
4.5	13 51 46.04	53 13.27	11 46 21.3	54 47.4	9.01944	9.7840	3.16	3.89	5	2	53.4
5.5	13 54 16.92	55 44.76	12 0 55.3	9 21.0	9.02115	9.7823	3.16	3.92	6	2	52.0
6.5	13 56 48.40	58 16.87	12 15 25.8	23 50.9	9.02285	9.7805	3.16	3.94	7	2	50.6
7.5	13 59 20.47	60 49.55	12 29 52.7	38 17.3	9.02453	9.7787	3.16	3.95	8	2	49.2
8.5	14 1 53.13	3 22.83	12 44 16.0	52 39.8	9.02620	9.7768	3.17	3.97	9	2	47.8
9.5	14 4 26.38	5 56.70	12 58 35.4	66 58.4	9.02793	9.7748	3.17	3.98	10	2	46.4
10.5	14 7 0 25	8 31.21	13 12 50.8	21 12.9	9.02968	9.7727	3.17	4.01	11	2	45.1
11.5	14 9 34.75	11 6.36	13 27 1.9	35 23.0	9.03145	9.7705	3.17	4.02	12	2	43.7
12.5	14 12 9.89	13 42.15	13 41 8.7	49 28.6	9.03322	9.7682	3.17	4.04	13	2	42.4
13.5	14 14 45.65	16 18.56	13 55 10.8	63 29.5	9.03493	9.7659	3.17	4.05	14	2	41.0
14.5	14 17 22.01	18 55.57	14 9 8.4	17 25.7	9.03664	9.7634	3.17	4.07	15	2	39.7
15.5	14 19 58.99	21 33.21	14 23 1.1	31 16.9	9.03835	9.7608	3.18	4.09	16	2	38.4
16.5	14 22 36.60	24 11.48	14 36 48.7	45 2.8	9.04008	9.7581	3.18	4.11	17	2	37.1
17.5	14 25 14.83	26 50.39	14 50 30.9	58 43.4	9.04181	9.7553	3.19	4.11	18	2	35.8
18.5	14 27 53.70	29 29.93	15 4 8.0	12 18.7	9.04356	9.7524	3.19	4.13	19	2	34.5
19.5	14 30 33.21	32 10.13	15 17 39.5	25 48.3	9.04530	9.7494	3.19	4.14	20	2	33.3
20.5	14 33 13.36	34 50.98	15 31 5.3	39 12.0	9.04706	9.7463	3.19	4.15	21	2	32.0
21.5	14 35 54.17	37 32.48	15 44 25.3	52 29.8	9.04882	9.7431	3.20	4.17	22	2	30.7
22.5	14 38 35.62	40 14.64	15 57 39.2	65 41.5	9.05058	9.7397	3.21	4.17	23	2	29.5
23.5	14 41 17.74	42 57.48	16 10 47.0	18 46.9	9.05237	9.7363	3.21	4.18	24	2	28.3
24.5	14 44 0 53	45 40.99	16 23 48.5	31 46.0	9.05416	9.7328	3.21	4.19	25	2	27.1
25.5	14 46 43.99	48 25.18	16 36 43.6	44 38.4	9.05595	9.7291	3.21	4.21	26	2	25.9
26.5	14 49 28.13	51 10.04	16 49 31.9	57 24.0	9.05773	9.7253	3.21	4.21	27	2	24.7
27.5	14 52 12.93	53 55.58	17 2 13.5	10 2.7	9.05951	9.7214	3.22	4.23	28	2	23.5
28.5	14 54 58.42	56 41.82	17 14 48.1	22 34.4	9.06132	9.7173	3.22	4.24	29	2	22.3
29.5	14 57 44.60	59 28.75	17 27 15.5	34 58.7	9.06311	9.7131	3.22	4.25	30	2	21.2
30.5	15 0 31.46	2 16.38	17 39 35.6	47 15.5	9.06492	9.7087	3.22	4.26	31	2	20.0
Oct. 1.5	15 3 19.03	5 4.72	17 51 48.1	59 24.7	9.06673	9.7043	3.22	4.26	2	2	18.9
2.5	15 6 7.29	7 53.74	18 3 53.2	11 26.3	9.06851	9.6997	3.22	4.28	3	2	17.8
3.5	15 8 56.24	10 43.46	18 15 50.3	23 19.7	9.07030	9.6948	3.23	4.29	4	2	16.7
4.5	15 11 45.89	13 33.89	18 27 39.4	35 5.0	9.07208	9.6898	3.22	4.30	5	2	15.6
5.5	15 14 36.23	16 25.00	18 39 20.3	46 42.1	9.07384	9.6847	3.22	4.30	6	2	14.5
6.5	15 17 27.27	19 16.82	18 50 52.9	58 10.6	9.07559	9.6795	3.22	4.31	7	2	13.4
7.5	15 20 18.99	22 9.32	19 2 17.0	9 30.4	9.07733	9.6740	3.22	4.32	8	2	12.3
8.5	15 23 11.40	25 2.53	19 13 32.1	20 41.1	9.07908	9.6682	3.22	4.33	9	2	11.3
9.4	15 26 4.51	27 56.42	19 24 38.4	31 42.9	9.08081	9.6623	3.21	4.34	10	2	10.2
10.4	15 28 58.30	30 51.01	19 35 35.5	42 35.4	9.08251	9.6563	3.21	4.35	11	2	9.2
11.4	15 31 52.77	33 46.27	19 46 23.4	53 18.4	9.08421	9.6500	3.21	4.36	12	2	8.2
12.4	15 34 47.92	36 42.22	19 57 1.7	63 51.7	9.08589	9.6434	3.21	4.37	13	2	7.2
13.4	15 37 43.74	39 38.84	20 7 30.3	14 15.2	9.08757	9.6367	3.21	4.37	14	2	6.2
14.4	15 40 40.25	42 35.15	20 17 49.1	24 28.7	9.08923	9.6297	3.21	4.39	15	2	5.2
15.4	15 43 37.43	45 34.14	20 27 57.9	34 31.9	9.09089	9.6224	3.21	4.39	16	2	4.2
16.4	15 46 35.29	48 32.80	20 37 56.3	44 24.7	9.09254	9.6148	3.21	4.40	17	2	3.3
17.4	15 49 33.82	51 32.15	20 47 44.2	54 7.0	9.09415	9.6070	3.20	4.40	18	2	2.3
18.4	15 52 33.01	54 32.15	20 57 21.6	63 38.4	9.09575	9.5991	3.20	4.42	19	2	1.4
19.4	15 55 32.86	57 32.82	21 6 48.2	12 58.9	9.09735	9.5907	3.20	4.42	20	2	0.4
20.4	15 58 33.37	60 34.14	21 16 3.8	22 8.3	9.09893	9.5820	3.20	4.43	21	1	59.5
21.4	16 1 34.54	3 36.13	21 25 8.2	31 6.3	9.10051	9.5731	3.20	4.43	22	1	58.6
22.4	16 4 36.36	6 38.78	21 34 1.4	39 53.1	9.10208	9.5639	3.20	4.44	23	1	57.7
23.4	16 7 38.85	9 42.09	21 42 43.1	48 27.9	9.10364	9.5543	3.20	4.45	24	1	56.8
24.4	16 10 41.98	12 46.05	21 51 13.2	56 51.1	9.10518	9.5442	3.20	4.45	25	1	56.0
25.4	16 13 45.77	15 50.66	21 59 31.5	65 2.3	9.10672	9.5339	3.19	4.46	26	1	55.1
26.4	16 16 50.20	18 55.93	22 7 37.8	13 1.5	9.10821	9.5231	3.19	4.46	27	1	54.2
27.4	16 19 55.26	22 1.83	22 15 32.0	20 48.4	9.10970	9.5120	3.19	4.47	28	1	53.4
28.4	16 23 0 96	25 8.36	22 23 14.0	28 22.8	9.11118	9.5004	3.18	4.48	29	1	52.6
29.4	16 26 7.28	28 15.51	22 30 43.4	35 44.6	9.11264	9.4881	3.18	4.48	30	1	51.8
30.4	16 29 14.22	31 23.29	22 38 0.2	42 53.5	9.11407	9.4755	3.17	4.49	31	1	50.9
31.4	16 32 21.79	34 31.69	22 45 4.1	49 49.4	9.11549	9.4622	3.17	4.49	32	1	50.1
32.4	16 35 29.98	37 40.69	22 51 55.1	56 32.2	+9.11688	-9.4486	+3.15	+4.50	33	1	49.4

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
Nov. <sup>d</sup>	<sup>h m s</sup>	<sup>m s</sup>	<sup>° ' "</sup>	<sup>' "</sup>					<sup>d h m</sup>
1.4	16 35 29.98	37 40.69	—22 51 55.1	56 32.2	+9.11688	—9.4486	+3.15	+4.50	2 1 49.4
2.4	16 38 38.73	40 50.26	22 58 33.0	63 1.7	9.11823	9.4341	3.15	4.51	3 1 48.6
3.4	16 41 48.08	44 0.42	23 4 57.6	9 17.8	9.11956	9.4190	3.14	4.51	4 1 47.8
4.4	16 44 58.00	47 11.17	23 11 8.8	15 20.4	9.12086	9.4033	3.14	4.51	5 1 47.0
5.4	16 48 8.49	50 22.45	23 17 6.5	21 9.2	9.12214	9.3868	3.11	4.52	6 1 46.3
6.4	16 51 19.52	53 34.29	23 22 50.4	26 44.2	9.12334	9.3692	3.11	4.53	7 1 45.5
7.4	16 54 31.08	56 46.66	23 28 20.4	32 5.0	9.12455	9.3509	3.11	4.53	8 1 44.8
8.4	16 57 43.17	59 59.55	23 33 36.4	37 11.6	9.12572	9.3314	3.09	4.54	9 1 44.1
9.4	17 0 55.77	3 12.92	23 38 38.1	42 3.8	9.12686	9.3108	3.08	4.54	10 1 43.4
10.4	17 4 8.87	6 26.81	23 43 25.4	46 41.5	9.12797	9.2892	3.08	4.54	11 1 42.7
11.4	17 7 22.46	9 41.17	23 47 58.4	51 4.6	9.12906	9.2660	3.05	4.55	12 1 42.0
12.4	17 10 36.52	12 55.99	23 52 16.7	55 12.9	9.13008	9.2411	3.04	4.55	13 1 41.3
13.4	17 13 51.03	16 11.26	23 56 20.2	59 6.2	9.13108	9.2147	3.04	4.56	14 1 40.6
14.3	17 17 5.99	19 26.99	24 0 8.7	2 44.5	9.13206	9.1862	3.02	4.56	15 1 39.9
15.3	17 20 21.38	22 43.14	24 3 42.4	6 7.7	9.13302	9.1556	3.02	4.56	16 1 39.2
16.3	17 23 37.19	25 59.68	24 7 0.9	9 15.7	9.13394	9.1226	2.97	4.56	17 1 38.6
17.3	17 26 53.40	29 16.61	24 10 4.3	12 8.4	9.13479	9.0867	2.97	4.56	18 1 37.9
18.3	17 30 10.00	32 33.94	24 12 52.5	14 45.8	9.13564	9.0474	2.96	4.57	19 1 37.2
19.3	17 33 26.98	35 51.65	24 15 25.4	17 7.6	9.13648	9.0033	2.96	4.58	20 1 36.6
20.3	17 36 44.34	39 9.73	24 17 42.7	19 13.9	9.13729	8.9543	2.93	4.58	21 1 36.0
21.3	17 40 2.05	42 28.15	24 19 44.6	21 4.4	9.13803	8.8987	2.91	4.58	22 1 35.3
22.3	17 43 20.09	45 46.90	24 21 30.7	22 39.1	9.13877	8.8338	2.90	4.58	23 1 34.7
23.3	17 46 38.47	49 5.95	24 23 1.0	23 57.8	9.13944	8.7573	2.87	4.58	24 1 34.1
24.3	17 49 57.17	52 25.34	24 24 15.4	25 0.3	9.14014	8.6635	2.86	4.59	25 1 33.5
25.3	17 53 16.16	55 45.01	24 25 13.6	25 46.7	9.14078	8.5428	2.83	4.59	26 1 32.8
26.3	17 56 35.43	59 4.95	24 25 55.8	26 17.0	9.14139	8.3750	2.80	4.59	27 1 32.2
27.3	17 59 54.98	62 25.14	24 26 21.9	26 31.0	9.14196	8.0969	2.77	4.59	28 1 31.6
28.3	18 3 14.78	5 45.58	24 26 31.8	26 28.8	9.14246	—7.1204	2.74	4.59	29 1 31.0
29.3	18 6 34.80	9 6.24	24 26 25.7	26 10.3	9.14297	+7.9939	2.73	4.59	30 1 30.4
30.3	18 9 55.05	12 27.10	24 26 3.4	25 35.8	9.14342	8.3238	2.68	4.59	31 1 29.8
Dec. 1.3	18 13 15.50	15 48.15	24 25 25.0	24 45.0	9.14385	8.5086	2.67	4.59	2 1 29.3
2.3	18 16 36.13	19 9.39	24 24 30.5	23 37.9	9.14426	8.6389	2.59	4.59	3 1 28.7
3.3	18 19 56.94	22 30.78	24 23 19.6	22 14.3	9.14459	8.7395	2.53	4.59	4 1 28.1
4.3	18 23 17.89	25 52.28	24 21 52.4	20 34.2	9.14484	8.8214	2.40	4.60	5 1 27.5
5.3	18 26 38.94	29 13.88	24 20 8.7	18 37.6	9.14506	8.8905	2.39	4.60	6 1 26.9
6.3	18 30 0.10	32 35.58	24 18 8.6	16 24.4	9.14529	8.9502	2.34	4.60	7 1 26.3
7.3	18 33 21.35	35 57.35	24 15 51.9	13 54.6	9.14546	9.0029	2.23	4.60	8 1 25.8
8.3	18 36 42.67	39 19.18	24 13 18.8	11 8.4	9.14558	9.0494	2.08	4.60	9 1 25.2
9.3	18 40 4.04	42 41.06	24 10 29.3	8 5.7	9.14569	9.0915	+1.98	4.60	10 1 24.6
10.3	18 43 25.45	46 2.96	24 7 23.3	4 46.5	9.14573	9.1298		4.60	11 1 24.0
11.3	18 46 46.86	49 24.84	24 4 1.0	1 10.9	9.14572	9.1648		4.60	12 1 23.5
12.3	18 50 8.27	52 46.71	23 60 22.4	57 18.8	9.14571	9.1974	—1.38	4.60	13 1 22.9
13.3	18 53 29.67	56 8.55	23 56 27.3	53 10.2	9.14568	9.2278	1.86	4.60	14 1 22.3
14.3	18 56 51.04	59 30.34	23 52 15.8	48 45.3	9.14558	9.2559	2.16	4.59	15 1 21.7
15.3	19 0 12.35	2 52.06	23 47 48.1	44 4.0	9.14542	9.2823	2.27	4.59	16 1 21.1
16.3	19 3 33.58	6 13.69	23 43 4.1	39 6.4	9.14525	9.3072	2.33	4.59	17 1 20.6
17.3	19 6 54.73	9 35.22	23 38 3.9	33 52.7	9.14505	9.3305	2.38	4.59	18 1 20.0
18.3	19 10 15.78	12 56.65	23 32 47.6	28 22.6	9.14483	9.3528	2.42	4.59	19 1 19.4
19.3	19 13 36.72	16 17.98	23 27 15.0	22 36.3	9.14459	9.3740	2.46	4.59	20 1 18.8
20.3	19 16 57.54	19 39.17	23 21 26.2	16 33.8	9.14430	9.3939	2.53	4.58	21 1 18.2
21.2	19 20 18.21	23 0.19	23 15 21.7	10 15.6	9.14398	9.4128	2.56	4.58	22 1 17.6
22.2	19 23 38.74	26 21.05	23 9 1.2	3 41.4	9.14366	9.4309	2.59	4.58	23 1 17.0
23.2	19 26 59.12	29 41.76	22 62 24.9	56 51.4	9.14331	9.4482	2.64	4.58	24 1 16.4
24.2	19 30 19.32	33 2.26	22 55 32.8	49 45.6	9.14289	9.4648	2.68	4.58	25 1 15.8
25.2	19 33 39.32	36 22.56	22 48 25.1	42 24.0	9.14245	9.4807	2.70	4.58	26 1 15.2
26.2	19 36 59.11	39 42.63	22 41 1.8	34 47.0	9.14199	9.4960	2.72	4.57	27 1 14.6
27.2	19 40 18.68	43 2.49	22 33 22.9	26 54.3	9.14151	9.5106	2.73	4.57	28 1 14.0
28.2	19 43 38.04	46 22.11	22 25 28.6	18 46.3	9.14103	9.5247	2.76	4.57	29 1 13.4
29.2	19 46 57.16	49 41.48	22 17 19.0	10 23.2	9.14048	9.5381	2.78	4.56	30 1 12.8
30.2	19 50 16.03	53 0.59	22 8 54.4	1 44.9	9.13993	9.5510	2.80	4.56	31 1 12.2
31.2	19 53 34.64	56 19.43	21 60 14.7	52 51.6	9.13935	9.5637	2.82	4.56	32 1 11.5
32.2	19 56 52.97	59 37.97	—21 51 19.9	43 43.2	+9.13875	+9.5760	—2.84	+4.56	33 1 10.9

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of a.		Log of b.		Mean Solar Time of Meridian Transit.						
	At Sidereal Oh.		At Transit.		At Sidereal Oh.		At Transit.		In R.A.	In Dec.	In R.A.	In Dec.							
Jan. 02	d	h	m	s	m	s	+	°	13	42.7	13	45.5	+8.2016	+9.0615	+3.17	+3.97	d	h	m
1.2	0	24	27.71		24	28.13		1	16	30.4	16	33.3	8.2133	9.0711	3.17	3.96	1	5	41.9
2.2	0	24	50.93		24	51.32		1	19	22.2	19	25.2	8.2243	9.0808	3.16	3.96	2	5	38.4
3.2	0	25	14.78		25	15.28		1	22	17.6	22	20.7	8.2352	9.0901	3.16	3.95	3	5	34.9
4.2	0	26	4.28		26	4.74		1	25	16.6	25	19.8	8.2457	9.0991	3.15	3.95	4	5	31.4
5.2	0	26	29.94		26	30.41		1	28	19.3	28	22.6	8.2559	9.1078	3.15	3.94	5	5	27.9
6.2	0	26	56.20		26	56.69		1	31	25.7	31	29.1	8.2657	9.1160	3.14	3.94	6	5	24.4
7.2	0	27	23.05		27	23.56		1	34	35.6	34	39.1	8.2752	9.1239	3.14	3.93	7	5	20.9
8.2	0	27	50.47		27	51.00		1	37	49.0	37	52.7	8.2844	9.1318	3.13	3.93	8	5	17.4
9.2	0	28	18.46		28	19.01		1	41	5.9	41	9.7	8.2932	9.1401	3.13	3.92	9	5	14.0
10.2	0	28	47.03		28	47.60		1	44	26.4	44	30.3	8.3018	9.1474	3.12	3.91	10	5	10.5
11.2	0	29	16.16		29	16.75		1	47	50.3	47	54.4	8.3100	9.1547	3.12	3.91	11	5	7.0
12.2	0	29	45.84		29	46.45		1	51	17.6	51	21.8	8.3180	9.1617	3.11	3.90	12	5	3.5
13.2	0	30	16.06		30	16.69		1	54	48.2	54	52.6	8.3258	9.1683	3.11	3.89	13	5	0.1
14.2	0	30	46.82		30	47.48		1	58	22.0	58	26.5	8.3334	9.1748	3.10	3.88	14	4	56.6
15.2	0	31	18.11		31	18.79		2	1	58.9	2	3.6	8.3407	9.1811	3.10	3.87	15	4	53.2
16.2	0	31	49.93		31	50.64		2	5	39.0	5	43.9	8.3479	9.1872	3.09	3.86	16	4	49.8
17.2	0	32	22.27		32	23.00		2	9	22.2	9	27.2	8.3549	9.1932	3.08	3.86	17	4	46.4
18.2	0	32	55.11		32	55.86		2	13	8.5	13	13.7	8.3615	9.1990	3.08	3.85	18	4	43.0
19.2	0	33	28.45		33	29.23		2	16	57.7	17	3.0	8.3679	9.2046	3.07	3.84	19	4	39.6
20.2	0	34	2.29		34	3.10		2	20	49.9	20	55.4	8.3741	9.2101	3.06	3.83	20	4	36.2
21.2	0	34	36.61		34	37.45		2	24	45.0	24	50.7	8.3802	9.2152	3.06	3.83	21	4	32.9
22.2	0	35	11.41		35	12.27		2	28	42.8	28	48.6	8.3862	9.2204	3.05	3.82	22	4	29.5
23.2	0	35	46.68		35	47.57		2	32	43.4	32	49.4	8.3919	9.2254	3.04	3.81	23	4	26.2
24.2	0	36	22.42		36	23.34		2	36	46.7	36	52.9	8.3976	9.2301	3.04	3.80	24	4	22.8
25.2	0	36	58.62		36	59.57		2	40	52.6	40	59.0	8.4029	9.2347	3.03	3.79	25	4	19.5
26.2	0	37	35.27		37	36.24		2	45	1.1	45	7.7	8.4082	9.2392	3.02	3.78	26	4	16.1
27.1	0	38	12.36		38	13.36		2	49	12.2	49	19.0	8.4134	9.2436	3.01	3.77	27	4	12.8
28.1	0	38	49.89		38	50.91		2	53	25.8	53	32.8	8.4184	9.2478	3.01	3.76	28	4	9.5
29.1	0	39	27.85		39	28.89		2	57	41.8	57	48.9	8.4233	9.2518	3.00	3.75	29	4	6.2
30.1	0	40	6.23		40	7.40		3	2	0.2	2	7.5	8.4281	9.2558	2.99	3.74	30	4	2.9
31.1	0	40	45.03		40	46.13		3	6	20.9	6	28.4	8.4327	9.2595	2.98	3.73	31	3	59.6
Feb. 1.1	0	41	24.24		41	25.37		3	10	43.9	10	51.6	8.4372	9.2634	2.98	3.72	1	3	56.3
2.1	0	42	3.86		42	5.02		3	15	9.2	15	17.0	8.4417	9.2672	2.97	3.71	2	3	53.0
3.1	0	42	43.88		42	45.07		3	19	36.8	19	44.8	8.4460	9.2707	2.96	3.70	3	3	49.7
4.1	0	43	24.30		43	25.52		3	24	6.6	24	14.8	8.4502	9.2741	2.96	3.69	4	3	46.5
5.1	0	44	5.11		44	6.36		3	28	38.4	28	46.8	8.4544	9.2775	2.95	3.68	5	3	43.2
6.1	0	44	46.30		44	47.58		3	33	12.3	33	20.9	8.4585	9.2807	2.94	3.67	6	3	40.0
7.1	0	45	27.87		45	29.18		3	37	48.3	37	57.1	8.4624	9.2841	2.94	3.66	7	3	36.7
8.1	0	46	9.82		46	11.16		3	42	26.3	42	35.3	8.4662	9.2872	2.93	3.65	8	3	33.5
9.1	0	46	52.13		46	53.51		3	47	6.2	47	15.4	8.4700	9.2901	2.92	3.64	9	3	30.2
10.1	0	47	34.80		47	36.21		3	51	48.0	51	57.4	8.4736	9.2929	2.92	3.63	10	3	27.0
11.1	0	48	17.81		48	19.26		3	56	31.6	56	41.2	8.4771	9.2957	2.91	3.62	11	3	23.8
12.1	0	49	1.17		49	2.65		4	1	17.0	1	26.8	8.4805	9.2985	2.90	3.61	12	3	20.6
13.1	0	49	44.88		49	46.40		4	6	4.3	6	14.3	8.4838	9.3012	2.89	3.60	13	3	17.4
14.1	0	50	28.92		50	30.47		4	10	53.2	11	3.3	8.4871	9.3036	2.89	3.59	14	3	14.2
15.1	0	51	13.29		51	14.88		4	15	43.7	15	54.0	8.4903	9.3059	2.88	3.57	15	3	11.0
16.1	0	51	57.98		51	59.60		4	20	35.8	20	46.3	8.4934	9.3082	2.87	3.56	16	3	7.8
17.1	0	52	42.98		52	44.64		4	25	29.4	25	40.1	8.4964	9.3103	2.87	3.55	17	3	4.6
18.1	0	53	28.29		53	29.98		4	30	24.5	30	35.4	8.4993	9.3125	2.86	3.53	18	2	1.4
19.1	0	54	13.90		54	15.63		4	35	21.0	35	32.1	8.5021	9.3147	2.85	3.52	19	2	58.2
20.1	0	54	59.79		55	1.55		4	40	18.9	40	30.2	8.5048	9.3166	2.85	3.51	20	2	55.0
21.1	0	55	45.96		55	47.76		4	45	18.1	45	29.7	8.5074	9.3185	2.84	3.49	21	2	51.8
22.1	0	56	32.42		56	34.25		4	50	18.6	50	30.4	8.5100	9.3203	2.83	3.48	22	2	48.7
23.1	0	57	19.16		57	21.03		4	55	20.4	55	32.4	8.5126	9.3222	2.82	3.46	23	2	45.5
24.1	0	58	6.18		58	8.09		5	0	23.4	0	35.6	8.5151	9.3239	2.82	3.45	24	2	42.4
25.1	0	58	53.46		58	55.41		5	5	27.6	5	40.0	8.5175	9.3256	2.81	3.43	25	2	39.2
26.1	0	59	41.00		59	42.98		5	10	32.9	10	45.5	8.5198	9.3272	2.80	3.42	26	2	36.1
27.1	1	0	28.79		0	30.81		5	15	39.3	15	52.1	8.5221	9.3287	2.79	3.40	27	2	33.0
28.1	1	1	16.84		1	18.90		5	20	46.7	20	59.7	8.5243	9.3301	2.78	3.39	28	2	29.8
29.1	1	2	5.14		2	7.24		5	25	55.1	26	8.4	8.5265	9.3314	2.77	3.37	29	2	26.7
30.1	1	2	53.67		2	55.80	+	5	31	4.4	31	17.9	+8.5286	+9.3327	+2.76	+3.35	30	2	23.6

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.		At Transit.		At Sidereal Ch.		At Transit.		In R.A.	In Dec.	In R.A.	In Dec.	
	d	h m s	d	h m s	°	'	°	'					
Mar.	1.1	1 2 5.14	2 7.24	+ 5 25 55.1	26 8.4	+8.5265	+9.3314	+2.77	+3.37	1 2 23.6			
	2.1	1 2 53.67	2 55.80	5 31 4.4	31 17.9	8.5286	9.3327	2.76	3.35	2 2 20.4			
	3.1	1 3 42.44	3 44.61	5 36 14.7	36 28.4	8.5308	9.3340	2.75	3.33	3 2 17.3			
	4.0	1 4 31.44	4 33.64	5 41 25.9	41 39.8	8.5328	9.3353	2.74	3.31	4 2 14.2			
	5.0	1 5 20.68	5 22.92	5 46 37.9	46 52.1	8.5348	9.3365	2.73	3.28	5 2 11.1			
	6.0	1 6 10.14	6 12.41	5 51 50.8	52 5.2	8.5368	9.3375	2.72	3.25	6 2 8.0			
	7.0	1 6 59.81	7 2.12	5 57 4.6	57 19.2	8.5388	9.3385	2.71	3.22	7 2 4.9			
	8.0	1 7 49.70	7 52.04	6 2 19.0	2 33.8	8.5407	9.3395	2.70	3.19	8 2 1.8			
	9.0	1 8 39.81	8 42.19	6 7 33.9	7 48.9	8.5425	9.3403	2.69	3.15	9 1 58.7			
	10.0	1 9 30.12	9 32.53	6 12 49.5	13 4.7	8.5442	9.3411	2.68	3.11	10 1 55.6			
	11.0	1 10 20.63	10 23.08	6 18 5.7	18 21.1	8.5458	9.3419	2.66	3.07	11 1 52.5			
	12.0	1 11 11.32	11 13.81	6 23 22.5	23 38.1	8.5473	9.3427	2.65	3.03	12 1 49.4			
	13.0	1 12 2.19	12 4.72	6 28 39.8	28 55.7	8.5488	9.3434	2.64	2.99	13 1 46.3			
	14.0	1 12 53.24	12 55.81	6 33 57.6	34 13.7	8.5503	9.3440	2.62	2.95	14 1 43.2			
	15.0	1 13 44.47	13 47.08	6 39 15.8	39 32.1	8.5518	9.3446	2.61	2.90	15 1 40.1			
	16.0	1 14 35.87	14 38.52	6 44 34.4	44 50.9	8.5532	9.3452	2.59	2.85	16 1 37.0			
	17.0	1 15 27.43	15 30.12	6 49 43.4	50 0.1	8.5546	9.3457	2.58	2.80	17 1 34.0			
	18.0	1 16 19.15	16 21.88	6 55 12.7	55 29.6	8.5559	9.3461	2.57	2.75	18 1 30.9			
	19.0	1 17 11.03	17 13.80	7 0 32.3	0 49.4	8.5572	9.3464	2.56	2.69	19 1 27.8			
	20.0	1 18 3.06	18 5.87	7 5 52.1	6 9.4	8.5585	9.3466	2.55	+2.63	20 1 24.7			
	21.0	1 18 55.24	18 58.10	7 11 12.0	11 29.5	8.5597	9.3468	2.53		21 1 21.7			
	22.0	1 19 47.56	19 50.46	7 16 32.1	16 49.8	8.5608	9.3470	2.52		22 1 18.6			
	23.0	1 20 40.01	20 42.95	7 21 52.3	22 10.2	8.5619	9.3470	2.50		23 1 15.6			
	24.0	1 21 32.59	21 35.57	7 27 12.5	27 30.6	8.5629	9.3470	2.49		24 1 12.5			
	25.0	1 22 25.30	22 28.32	7 32 32.7	32 41.1	8.5639	9.3470	2.48		25 1 9.5			
	26.0	1 23 18.13	23 21.19	7 37 53.0	38 11.5	8.5649	9.3470	2.46		26 1 6.4			
	27.0	1 24 11.08	24 14.18	7 43 13.2	43 31.9	8.5659	9.3470	2.45		27 1 3.4			
	28.0	1 25 4.14	25 7.28	7 48 33.4	48 52.3	8.5668	9.3470	2.43		28 1 0.3			
	29.0	1 25 57.30	26 0.48	7 53 53.5	54 12.6	8.5677	9.3468	2.42		29 0 57.3			
	30.0	1 26 50.56	26 53.78	7 59 13.5	59 32.8	8.5685	9.3466	2.40		30 0 54.2			
	Apr.	31.0	1 27 43.93	27 47.18	8 4 33.3	4 52.8	8.5693	9.3464	2.38	-2.63	31 0 51.2		
1.0		1 28 37.40	28 40.69	8 9 52.9	10 12.6	8.5701	9.3461	2.36	2.69	1 0 48.1			
2.0		1 29 30.97	29 34.30	8 15 12.2	15 32.1	8.5709	9.3457	2.34	2.75	2 0 45.1			
3.0		1 30 24.64	30 28.01	8 20 31.4	20 51.5	8.5717	9.3452	2.32	2.81	3 0 42.0			
4.0		1 31 18.39	31 21.80	8 25 50.2	26 10.5	8.5724	9.3447	2.30	2.87	4 0 39.0			
5.0		1 32 12.22	32 15.67	8 31 8.7	31 29.2	8.5730	9.3442	2.27	2.92	5 0 35.9			
6.0		1 33 6.13	33 9.62	8 36 26.8	36 47.5	8.5736	9.3437	2.24	2.97	6 0 32.9			
7.0		1 34 0.11	34 3.64	8 41 44.5	42 5.4	8.5741	9.3432	2.20	3.01	7 0 29.9			
8.0		1 34 54.16	34 57.73	8 47 1.9	47 23.0	8.5746	9.3427	2.16	3.05	8 0 26.8			
8.9		1 35 48.28	35 51.89	8 52 18.9	52 40.2	8.5751	9.3422	2.12	3.09	9 0 23.8			
9.9		1 36 42.46	36 46.11	8 57 35.4	57 56.8	8.5756	9.3416	2.08	3.12	10 0 20.8			
10.9		1 37 36.70	37 40.39	9 2 51.3	3 12.8	8.5761	9.3409	2.04	3.15	11 0 17.8			
11.9		1 38 30.99	38 34.72	9 8 6.6	8 28.3	8.5766	9.3400	1.99	3.17	12 0 14.7			
12.9		1 39 25.33	39 29.10	9 13 21.4	13 43.2	8.5770	9.3392	1.94	3.19	13 0 11.7			
13.9		1 40 19.71	40 23.51	9 18 36.6	18 57.5	8.5773	9.3382	1.89	3.21	14 0 8.7			
14.9		1 41 14.12	41 17.96	9 23 49.1	24 11.2	8.5775	9.3372	+1.84	3.23	15 0 5.7			
15.9		1 42 8.56	42 12.43	9 29 1.8	29 24.0	8.5777	9.3362		3.25	16 0 2.6			
16.9		1 43 3.02	43 6.93	9 34 13.8	34 36.1	8.5778	9.3352		3.27	16 23 59.6			
17.9		1 43 57.50	44 1.44	9 39 25.1	39 47.5	8.5779	9.3342		3.29	17 23 56.6			
18.9		1 44 52.00	44 55.98	9 44 35.6	44 58.1	8.5780	9.3331		3.31	18 23 53.6			
19.9	1 45 46.52	45 50.53	9 49 45.3	50 8.0	8.5781	9.3320		3.32	19 23 50.5				
20.9	1 46 41.04	46 45.09	9 54 54.1	55 16.9	8.5782	9.3308		3.33	20 23 47.5				
21.9	1 47 35.56	47 39.64	10 0 2.0	0 24.9	8.5782	9.3295		3.34	21 23 44.5				
22.9	1 48 30.09	48 34.20	10 5 9.1	5 32.1	8.5782	9.3282		3.35	22 23 41.5				
23.9	1 49 24.62	49 28.77	10 10 15.2	10 38.4	8.5782	9.3268		3.36	23 23 38.4				
24.9	1 50 19.14	50 23.32	10 15 20.3	15 43.6	8.5781	9.3254		3.37	24 23 35.4				
25.9	1 51 13.64	51 17.85	10 20 24.4	20 47.9	8.5780	9.3239		3.38	25 23 32.4				
26.9	1 52 8.13	52 12.37	10 25 27.5	25 51.1	8.5779	9.3224		3.39	26 23 29.4				
27.9	1 53 2.61	53 6.89	10 30 29.6	30 53.3	8.5778	9.3209		3.40	27 23 26.3				
28.9	1 53 57.07	54 1.38	10 35 30.7	35 54.5	8.5776	9.3194		3.41	28 23 23.3				
29.9	1 54 51.48	54 55.82	10 40 30.7	40 54.6	8.5773	9.3179	-1.84	3.42	29 23 20.3				
30.9	1 55 45.88	55 50.25	+10 45 29.6	45 53.6	+8.5770	+9.3163	-1.89	-3.43	30 23 17.3				

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.			Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Translt.	At Sidereal Oh.	At Translt.	In R. A.	In Dec.	In R. A.	In Dec.		
	d h m s	m s	° ' "	° ' "					d h m	
May 1.9	1 56 40.25	56 44.65	+10 50' 27.4	50' 51.5	+8.5768	+9.3147	-1.94	-3.44	1 23 14.2	
2.9	1 57 34.59	57 39.02	10 55 24.0	55 48.2	8.5765	9.3130	1.99	3.45	2 23 11.2	
3.9	1 58 28.88	58 33.34	11 0 19.5	0 43.8	8.5761	9.3113	2.03	3.46	3 23 8.2	
4.9	1 59 23.12	59 27.61	11 5 13.7	5 38.1	8.5757	9.3095	2.07	3.47	4 23 5.1	
5.9	2 0 17.31	0 21.83	11 10 6.7	10 31.2	8.5753	9.3076	2.11	3.48	5 23 2.1	
6.9	2 1 11.44	1 15.99	11 14 58.5	15 23.1	8.5748	9.3056	2.15	3.49	6 22 59.1	
7.9	2 2 5.51	2 10.08	11 19 49.0	20 13.6	8.5743	9.3036	2.19	3.50	7 22 56.0	
8.9	2 2 59.51	3 4.11	11 24 38.2	25 2.9	8.5738	9.3016	2.23	3.51	8 22 53.0	
9.9	2 3 53.45	3 58.08	11 29 26.0	29 50.8	8.5733	9.2996	2.26	3.52	9 22 50.0	
10.9	2 4 47.31	4 51.97	11 34 12.4	34 37.3	8.5727	9.2975	2.29	3.53	10 22 46.9	
11.9	2 5 41.09	5 45.77	11 38 57.5	39 22.4	8.5721	9.2954	2.32	3.54	11 22 43.9	
12.9	2 6 34.78	6 39.49	11 43 41.1	44 6.1	8.5714	9.2932	2.35	3.54	12 22 40.9	
13.9	2 7 28.38	7 33.11	11 48 23.3	48 48.3	8.5706	9.2910	2.38	3.55	13 22 37.8	
14.9	2 8 21.89	8 26.65	11 53 4.0	53 29.1	8.5697	9.2888	2.40	3.55	14 22 34.8	
15.8	2 9 15.29	9 20.07	11 57 43.2	58 8.3	8.5688	9.2865	2.42	3.56	15 22 31.7	
16.8	2 10 8.58	10 13.39	12 2 20.8	2 45.9	8.5679	9.2841	2.44	3.57	16 22 28.7	
17.8	2 11 1.77	11 6.60	12 6 57.0	7 22.2	8.5670	9.2816	2.45	3.57	17 22 25.6	
18.8	2 11 54.84	11 59.70	12 11 31.6	11 56.8	8.5660	9.2791	2.47	3.58	18 22 22.6	
19.8	2 12 47.78	12 52.66	12 16 4.6	16 29.8	8.5649	9.2765	2.48	3.58	19 22 19.5	
20.8	2 13 40.59	13 45.49	12 20 36.0	21 1.2	8.5638	9.2738	2.50	3.59	20 22 16.5	
21.8	2 14 33.28	14 38.20	12 25 5.7	25 30.9	8.5627	9.2711	2.51	3.60	21 22 13.4	
22.8	2 15 25.84	15 30.78	12 29 33.7	29 58.8	8.5616	9.2683	2.52	3.60	22 22 10.4	
23.8	2 16 18.26	16 23.22	12 34 0.1	34 25.2	8.5605	9.2655	2.54	3.61	23 22 7.3	
24.8	2 17 10.54	17 15.52	12 38 24.7	38 49.8	8.5594	9.2627	2.55	3.61	24 22 4.3	
25.8	2 18 2.67	18 7.67	12 42 47.7	43 12.8	8.5582	9.2599	2.56	3.62	25 22 1.2	
26.8	2 18 54.66	18 59.67	12 47 9.0	47 34.0	8.5570	9.2571	2.58	3.63	26 21 58.2	
27.8	2 19 46.50	19 51.53	12 51 28.6	51 53.6	8.5557	9.2542	2.59	3.63	27 21 55.1	
28.8	2 20 38.18	20 43.22	12 55 46.4	56 11.4	8.5543	9.2513	2.60	3.64	28 21 52.1	
29.8	2 21 29.70	21 34.76	13 0 2.4	0 27.4	8.5529	9.2483	2.61	3.64	29 21 49.0	
30.8	2 22 21.04	22 26.11	13 4 16.6	4 41.5	8.5515	9.2452	2.62	3.65	30 21 45.9	
31.8	2 23 12.21	23 17.29	13 8 28.9	8 53.8	8.5500	9.2421	2.64	3.66	31 21 42.8	
June 1.8	2 24 3.19	24 8.29	13 12 39.3	13 4.2	8.5484	9.2389	2.65	3.66	1 21 39.7	
2.8	2 24 53.99	24 59.10	13 16 47.9	17 12.7	8.5478	9.2355	2.66	3.67	2 21 36.6	
3.8	2 25 44.61	25 49.73	13 20 54.7	21 19.5	8.5451	9.2322	2.67	3.67	3 21 33.5	
4.8	2 26 35.03	26 40.16	13 24 59.6	25 24.4	8.5434	9.2288	2.68	3.68	4 21 30.4	
5.8	2 27 25.25	27 30.39	13 29 2.6	29 27.3	8.5416	9.2254	2.69	3.68	5 21 27.3	
6.8	2 28 15.26	28 20.40	13 33 3.6	33 28.3	8.5398	9.2220	2.70	3.69	6 21 24.2	
7.8	2 29 5.06	29 10.20	13 37 2.7	37 27.3	8.5380	9.2184	2.71	3.69	7 21 21.1	
8.8	2 29 54.64	29 59.79	13 40 59.8	41 24.3	8.5361	9.2145	2.72	3.69	8 21 18.0	
9.8	2 30 43.99	30 49.14	13 44 54.8	45 19.3	8.5341	9.2107	2.73	3.70	9 21 14.9	
10.8	2 31 33.10	31 38.25	13 48 47.8	49 12.2	8.5320	9.2067	2.74	3.70	10 21 11.8	
11.8	2 32 21.97	32 27.12	13 52 38.7	53 3.0	8.5298	9.2029	2.75	3.70	11 21 8.7	
12.8	2 33 10.59	33 15.75	13 56 27.5	56 51.8	8.5275	9.1991	2.76	3.71	12 21 5.5	
13.8	2 33 58.97	34 4.12	14 0 14.3	0 38.5	8.5251	9.1953	2.77	3.71	13 21 2.4	
14.8	2 34 47.09	34 52.23	14 3 59.0	4 23.0	8.5227	9.1913	2.78	3.71	14 20 59.3	
15.8	2 35 34.94	35 40.09	14 7 41.5	8 5.4	8.5203	9.1870	2.79	3.72	15 20 56.2	
16.8	2 36 22.53	36 27.67	14 11 21.9	11 45.7	8.5179	9.1826	2.80	3.72	16 20 53.0	
17.8	2 37 9.84	37 14.98	14 15 0.1	15 23.7	8.5154	9.1783	2.81	3.72	17 20 49.9	
18.8	2 37 56.88	38 2.02	14 18 36.1	18 59.7	8.5128	9.1738	2.82	3.73	18 20 46.8	
19.8	2 38 43.64	38 48.77	14 22 10.0	22 33.4	8.5101	9.1693	2.83	3.73	19 20 43.6	
20.8	2 39 30.11	39 35.22	14 25 41.7	25 5.0	8.5073	9.1648	2.84	3.73	20 20 40.4	
21.7	2 40 16.26	40 21.36	14 29 11.2	29 34.3	8.5045	9.1603	2.85	3.74	21 20 37.3	
22.7	2 41 2.10	41 7.20	14 32 38.4	33 1.4	8.5016	9.1557	2.86	3.74	22 20 34.1	
23.7	2 41 47.64	41 52.74	14 36 3.4	36 26.3	8.4987	9.1510	2.87	3.74	23 20 30.9	
24.7	2 42 32.88	42 37.98	14 39 26.2	39 48.9	8.4957	9.1463	2.88	3.74	24 20 27.7	
25.7	2 43 17.80	43 22.90	14 42 46.7	43 9.3	8.4926	9.1414	2.89	3.75	25 20 24.5	
26.7	2 44 2.40	44 7.49	14 46 5.0	46 27.3	8.4894	9.1363	2.90	3.75	26 20 21.3	
27.7	2 44 46.66	44 51.74	14 49 20.9	49 43.1	8.4861	9.1312	2.91	3.75	27 20 18.1	
28.7	2 45 30.59	45 35.65	14 52 34.5	52 56.6	8.4828	9.1260	2.92	3.75	28 20 14.9	
29.7	2 46 14.19	46 19.22	14 55 45.8	56 7.7	8.4793	9.1208	2.93	3.76	29 20 11.7	
30.7	2 46 57.43	47 2.44	14 58 54.7	59 16.5	8.4758	9.1153	2.94	3.76	30 20 8.5	
31.7	2 47 40.32	47 45.31	+15 2 1.3	2 22.9	+8.4722	+9.1097	-2.95	-3.76	31 20 5.3	

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of a.		Log of b.		Mean Solar Time of Meridian Transit.		
	At Sidereal Oh.			At Transit.	At Sidereal Oh.			At Transit.	In R.A.	In Dec.	In R.A.	In Dec.			
July	d	h	m	s	m	s	°	'	"	°	'	"	d	h	m
1.7	2	47	40.32	47	45.31	+15	2	13	2	24.9	+8.4722	+9.1097	-2.95	-3.76	1 20 5.3
2.7	2	48	22.85	48	27.82	15	5	5.5	5	26.9	8.4684	9.1041	2.96	3.77	2 20 2.1
3.7	2	49	5.01	49	9.95	15	8	7.3	8	28.4	8.4645	9.0981	2.96	3.77	3 19 58.9
4.7	2	49	46.79	49	51.70	15	11	6.6	11	27.5	8.4605	9.0922	2.97	3.77	4 19 55.7
5.7	2	50	28.18	50	33.06	15	14	3.5	14	24.2	8.4563	9.0863	2.98	3.78	5 19 52.4
6.7	2	51	9.17	51	14.01	15	16	58.0	17	18.6	8.4521	9.0803	2.99	3.78	6 19 49.1
7.7	2	51	49.75	51	54.56	15	19	50.1	20	10.4	8.4478	9.0740	2.99	3.78	7 19 45.9
8.7	2	52	29.92	52	34.71	15	22	39.7	22	59.8	8.4434	9.0679	3.00	3.79	8 19 42.7
9.7	2	53	9.68	53	14.43	15	25	26.8	25	46.6	8.4387	9.0612	3.01	3.79	9 19 39.4
10.7	2	53	49.01	53	53.72	15	28	11.4	28	31.0	8.4339	9.0546	3.02	3.79	10 19 36.1
11.7	2	54	27.90	54	32.58	15	30	53.5	31	12.9	8.4290	9.0478	3.03	3.79	11 19 32.8
12.7	2	55	6.35	55	10.99	15	33	33.1	33	52.2	8.4239	9.0411	3.03	3.80	12 19 29.5
13.7	2	55	44.35	55	48.96	15	36	10.1	36	29.0	8.4187	9.0339	3.04	3.80	13 19 26.2
14.7	2	56	21.90	56	26.47	15	38	44.5	39	3.1	8.4135	9.0266	3.05	3.80	14 19 22.9
15.7	2	56	58.99	57	3.52	15	41	16.3	41	34.8	8.4081	9.0194	3.05	3.80	15 19 19.6
16.7	2	57	35.62	57	40.10	15	43	45.6	44	3.8	8.4026	9.0119	3.06	3.81	16 19 16.3
17.7	2	58	11.77	58	16.21	15	46	12.3	46	30.2	8.3968	9.0042	3.07	3.81	17 19 13.0
18.7	2	58	47.44	58	51.83	15	48	36.4	48	54.0	8.3910	8.9960	3.07	3.81	18 19 9.6
19.7	2	59	22.62	59	26.96	15	50	57.8	51	15.1	8.3849	8.9880	3.08	3.81	19 19 6.3
20.7	2	59	57.31	0	1.60	15	53	16.5	53	33.7	8.3787	8.9799	3.09	3.82	20 19 2.9
21.7	3	0	31.50	0	35.74	15	55	32.7	55	49.6	8.3723	8.9716	3.10	3.82	21 18 59.5
22.7	3	1	5.18	1	9.38	15	57	46.3	58	2.9	8.3657	8.9632	3.10	3.82	22 18 56.1
23.7	3	1	38.35	1	42.50	15	59	57.2	60	13.5	8.3589	8.9543	3.11	3.82	23 18 52.7
24.7	3	2	11.00	2	15.09	16	2	5.5	2	21.4	8.3519	8.9451	3.12	3.82	24 18 49.3
25.7	3	2	43.12	2	47.16	16	4	11.0	4	26.7	8.3447	8.9357	3.12	3.83	25 18 45.9
26.7	3	3	14.71	3	18.69	16	6	13.8	6	29.2	8.3372	8.9261	3.13	3.83	26 18 42.5
27.7	3	3	45.75	3	49.67	16	8	13.9	8	29.0	8.3296	8.9163	3.14	3.83	27 18 39.1
28.6	3	4	16.24	4	20.10	16	10	11.3	10	26.1	8.3216	8.9061	3.14	3.83	28 18 35.7
29.6	3	4	46.16	4	49.96	16	12	5.9	12	20.4	8.3135	8.8958	3.15	3.83	29 18 32.3
30.6	3	5	15.52	5	19.26	16	13	57.8	14	12.0	8.3052	8.8853	3.15	3.84	30 18 28.9
31.6	3	5	44.31	5	47.98	16	15	47.0	16	0.9	8.2964	8.8746	3.16	3.84	31 18 25.4
Aug. 1.6	3	6	12.51	6	16.11	16	17	33.4	17	47.0	8.2874	8.8628	3.16	3.84	1 18 22.0
2.6	3	6	40.12	6	43.64	16	19	16.0	19	29.3	8.2778	8.8510	3.17	3.84	2 18 18.5
3.6	3	7	7.12	7	10.58	16	20	57.7	21	10.7	8.2680	8.8390	3.17	3.84	3 18 15.0
4.6	3	7	33.50	7	36.88	16	22	35.7	22	48.3	8.2579	8.8261	3.18	3.85	4 18 11.5
5.6	3	7	59.26	8	2.57	16	24	10.8	24	23.1	8.2474	8.8133	3.18	3.85	5 18 8.0
6.6	3	8	24.40	8	27.64	16	25	43.1	25	55.0	8.2366	8.7997	3.19	3.85	6 18 4.5
7.6	3	8	48.90	8	42.06	16	27	12.5	27	24.1	8.2252	8.7861	3.19	3.85	7 18 1.0
8.6	3	9	12.76	9	15.84	16	28	39.1	28	50.3	8.2133	8.7715	3.20	3.85	8 17 57.4
9.6	3	9	35.96	9	38.96	16	30	2.8	30	13.7	8.2009	8.7565	3.20	3.85	9 17 53.9
10.6	3	9	58.50	10	1.42	16	31	23.6	31	34.1	8.1882	8.7409	3.21	3.86	10 17 50.4
11.6	3	10	20.38	10	23.22	16	32	41.5	32	51.7	8.1750	8.7247	3.21	3.86	11 17 46.8
12.6	3	10	41.60	10	44.35	16	33	56.5	34	6.3	8.1614	8.7079	3.22	3.86	12 17 43.2
13.6	3	11	2.14	11	4.80	16	35	8.6	35	18.0	8.1467	8.6898	3.22	3.86	13 17 39.6
14.6	3	11	21.99	11	24.56	16	36	17.7	36	26.7	8.1316	8.6715	3.23	3.86	14 17 36.0
15.6	3	11	41.15	11	43.63	16	37	23.9	37	32.5	8.1160	8.6525	3.23	3.86	15 17 32.4
16.6	3	11	59.62	12	2.02	16	38	27.2	38	35.4	8.0998	8.6326	3.24	3.86	16 17 28.7
17.6	3	12	17.39	12	19.70	16	39	27.5	39	35.3	8.0826	8.6117	3.24	3.86	17 17 25.1
18.6	3	12	34.46	12	36.68	16	40	24.9	40	32.3	8.0646	8.5890	3.25	3.86	18 17 21.4
19.6	3	12	50.81	12	52.94	16	41	19.3	41	26.3	8.0455	8.5659	3.25	3.87	19 17 17.7
20.6	3	13	6.43	13	8.46	16	42	10.8	42	17.4	8.0251	8.5406	3.26	3.87	20 17 14.0
21.6	3	13	21.33	13	23.26	16	42	59.3	43	5.5	8.0039	8.5137	3.26	3.87	21 17 10.3
22.6	3	13	35.50	13	37.33	16	43	44.8	43	50.7	7.9815	8.4851	3.27	3.87	22 17 6.6
23.6	3	13	48.94	13	50.67	16	44	27.3	44	32.8	7.9578	8.4559	3.27	3.87	23 17 2.9
24.6	3	14	1.64	14	3.28	16	45	6.9	45	12.0	7.9325	8.4225	3.28	3.87	24 16 59.2
25.6	3	14	13.59	14	15.13	16	45	43.5	45	48.2	7.9049	8.3869	3.28	3.87	25 16 55.5
26.6	3	14	24.78	14	26.23	16	46	17.1	46	21.4	7.8754	8.3467	3.28	3.87	26 16 51.8
27.6	3	14	35.21	14	36.56	16	46	47.6	46	51.5	7.8437	8.3040	3.29	3.87	27 16 48.0
28.6	3	14	44.88	14	46.13	16	47	15.1	47	18.6	7.8091	8.2549	3.29	3.88	28 16 44.2
29.6	3	14	53.78	14	54.93	16	47	39.4	47	42.5	7.7710	8.2014	3.29	3.88	29 16 40.4
30.6	3	15	1.90	15	2.95	16	48	0.9	48	3.6	7.7292	8.1383	3.30	3.88	30 16 36.6
31.6	3	15	9.23	15	10.17	+16	48	19.2	48	21.5	+7.6830	+8.0669	-3.30	-3.88	31 16 32.8



## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of <i>a</i> .		Log of <i>b</i> .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
Sept. 1.6	d h m s	m s	° ′ ″	° ′ ″					d h m
1.6	3 15 15.78	15 16.61	+16 48 34.5	48 36.4	+7.6305	+7.9783	-3.30	-3.88	1 16 29.0
2.5	3 15 21.53	15 22.25	16 48 46.7	48 48.2	7.5700	7.8669	3.30	3.88	2 16 25.2
3.5	3 15 26.49	15 27.10	16 48 55.8	48 56.9	7.4996	7.7167	3.30	3.88	3 16 21.4
4.5	3 15 30.64	15 31.14	16 49 1.8	49 2.5	7.4145	7.4851	3.31	3.88	4 16 17.5
5.5	3 15 33.98	15 34.37	16 49 4.7	49 4.9	7.3085	+6.9555	3.31	3.88	5 16 13.6
6.5	3 15 36.52	15 36.80	16 49 4.6	49 4.4	7.1679	-7.0720	3.31	3.88	6 16 9.7
7.5	3 15 38.24	15 38.41	16 49 1.3	49 0.7	6.9589	7.5228	3.31	3.88	7 16 5.8
8.5	3 15 39.15	15 39.21	16 48 55.0	48 54.0	+6.5492	7.7392	3.31	3.89	8 16 1.9
9.5	3 15 39.26	15 39.21	16 48 45.5	48 44.0	-6.3187	7.8830	3.31	3.89	9 15 58.0
10.5	3 15 38.56	15 38.40	16 48 32.9	48 31.0	6.8869	7.9908	3.31	3.89	10 15 54.1
11.5	3 15 37.05	15 36.78	16 48 17.2	48 14.9	7.1249	8.0771	3.31	3.89	11 15 50.1
12.5	3 15 34.73	15 34.35	16 47 58.5	47 55.8	7.2762	8.1491	3.31	3.89	12 15 46.1
13.5	3 15 31.61	15 31.12	16 47 36.8	47 33.7	7.3881	8.2090	3.31	3.89	13 15 42.1
14.5	3 15 27.69	15 27.09	16 47 12.0	47 8.4	7.4781	8.2616	3.31	3.89	14 15 38.1
15.5	3 15 22.96	15 22.25	16 46 44.2	46 40.2	7.5517	8.3085	3.31	3.89	15 15 34.1
16.5	3 15 17.43	15 16.62	16 46 13.4	46 9.0	7.6147	8.3521	3.31	3.89	16 15 30.1
17.5	3 15 11.09	15 10.17	16 45 39.5	45 34.7	7.6696	8.3906	3.31	3.89	17 15 26.0
18.5	3 15 3.95	15 2.92	16 45 2.6	44 57.4	7.7184	8.4259	3.31	3.89	18 15 22.0
19.5	3 14 56.02	14 54.88	16 44 22.7	44 17.1	7.7622	8.4576	3.31	3.89	19 15 17.9
20.5	3 14 47.29	14 46.04	16 43 39.8	43 33.8	7.8021	8.4880	3.31	3.89	20 15 13.8
21.5	3 14 37.76	14 36.41	16 42 54.0	42 47.6	7.8381	8.5165	3.31	3.89	21 15 9.7
22.5	3 14 27.45	14 25.99	16 42 5.2	41 58.4	7.8714	8.5432	3.31	3.89	22 15 5.6
23.5	3 14 16.35	14 14.79	16 41 13.5	41 6.3	7.9015	8.5675	3.30	3.88	23 15 1.5
24.5	3 14 4.48	14 2.82	16 40 18.9	40 11.3	7.9297	8.5906	3.30	3.88	24 14 57.4
25.5	3 13 51.84	13 50.08	16 39 21.3	39 13.3	7.9561	8.6132	3.29	3.88	25 14 53.3
26.5	3 13 38.43	13 36.57	16 38 20.9	38 12.5	7.9812	8.6333	3.29	3.87	26 14 49.2
27.5	3 13 24.26	13 22.30	16 37 17.6	37 8.8	8.0048	8.6532	3.28	3.87	27 14 45.0
28.5	3 13 9.32	13 7.26	16 36 11.4	36 2.2	8.0269	8.6722	3.28	3.86	28 14 40.8
29.5	3 12 53.63	12 51.47	16 35 2.3	34 52.8	8.0473	8.6904	3.27	3.86	29 14 36.6
30.5	3 12 37.20	12 34.94	16 33 50.4	33 40.5	8.0669	8.7073	3.26	3.85	30 14 32.4
Oct. 1.5	3 12 20.03	12 17.68	16 32 35.7	32 25.5	8.0853	8.7230	3.26	3.85	1 14 28.2
2.5	3 12 2.14	11 59.70	16 31 18.3	31 7.7	8.1029	8.7381	3.25	3.84	2 14 24.0
3.5	3 11 43.54	11 41.01	16 29 58.1	29 47.2	8.1193	8.7528	3.24	3.83	3 14 19.7
4.5	3 11 24.25	11 21.63	16 28 35.2	28 24.0	8.1350	8.7669	3.23	3.82	4 14 15.5
5.5	3 11 4.26	11 1.56	16 27 9.7	26 58.2	8.1499	8.7801	3.22	3.81	5 14 11.2
6.5	3 10 43.59	10 40.81	16 25 41.6	25 29.8	8.1640	8.7929	3.21	3.80	6 14 6.9
7.5	3 10 22.26	10 19.40	16 24 10.9	23 58.8	8.1773	8.8049	3.20	3.79	7 14 2.6
8.5	3 10 0.29	9 57.35	16 22 37.8	22 25.4	8.1899	8.8161	3.19	3.78	8 13 58.3
9.4	3 9 37.68	9 34.66	16 21 2.3	20 49.6	8.2018	8.8270	3.18	3.77	9 13 54.0
10.4	3 9 14.46	9 11.37	16 19 24.4	19 11.4	8.2134	8.8377	3.17	3.76	10 13 49.7
11.4	3 8 50.63	8 47.47	16 17 44.1	17 30.9	8.2241	8.8476	3.16	3.75	11 13 45.4
12.4	3 8 26.22	8 22.99	16 16 1.5	15 48.0	8.2341	8.8573	3.15	3.74	12 13 41.1
13.4	3 8 1.25	7 57.95	16 14 16.7	14 3.0	8.2439	8.8665	3.13	3.73	13 13 36.7
14.4	3 7 35.73	7 32.37	16 12 29.7	12 15.7	8.2530	8.8750	3.12	3.72	14 13 32.3
15.4	3 7 9.68	7 6.26	16 10 40.6	10 26.4	8.2618	8.8830	3.11	3.71	15 13 27.9
16.4	3 6 43.12	6 39.64	16 8 49.6	8 35.1	8.2700	8.8903	3.09	3.69	16 13 23.6
17.4	3 6 16.06	6 12.52	16 6 56.7	6 42.0	8.2780	8.8977	3.08	3.68	17 13 19.2
18.4	3 5 48.52	5 44.93	16 5 1.9	4 47.0	8.2852	8.9049	3.06	3.66	18 13 14.8
19.4	3 5 20.53	5 16.89	16 3 5.3	2 56.2	8.2923	8.9121	3.04	3.64	19 13 10.4
20.4	3 4 52.09	4 48.40	16 1 6.9	0 51.6	8.2989	8.9186	3.02	3.62	20 13 6.0
21.4	3 4 23.23	4 19.50	15 59 6.9	58 51.4	8.3050	8.9247	3.00	3.60	21 13 1.6
22.4	3 3 53.97	3 50.20	15 57 5.2	56 49.5	8.3106	8.9301	2.97	3.58	22 12 57.2
23.4	3 3 24.34	3 20.53	15 55 2.0	54 46.2	8.3162	8.9350	2.94	3.56	23 12 52.8
24.4	3 2 54.24	2 50.50	15 52 57.4	52 41.4	8.3213	8.9399	2.92	3.54	24 12 48.4
25.4	3 2 24.00	2 20.13	15 50 51.4	50 35.3	8.3259	8.9444	2.89	3.51	25 12 43.9
26.4	3 1 53.35	1 49.45	15 48 44.0	48 27.8	8.3303	8.9488	2.86	3.48	26 12 39.5
27.4	3 1 22.40	1 18.48	15 46 35.5	46 19.2	8.3344	8.9529	2.82	3.44	27 12 35.0
28.4	3 0 51.18	0 47.24	15 44 25.9	44 9.5	8.3378	8.9565	2.78	3.40	28 12 30.6
29.4	3 0 19.72	0 15.76	15 42 15.4	41 58.9	8.3410	8.9595	2.73	3.35	29 12 26.2
30.4	2 59 48.04	59 44.07	15 40 3.9	39 47.3	8.3439	8.9622	2.68	3.30	30 12 21.7
31.4	2 59 16.16	59 12.18	15 37 51.6	37 35.0	8.3465	8.9645	2.62	3.25	31 12 17.2
32.4	2 58 44.10	58 40.11	+15 35 38.7	35 22.1	-8.3486	-8.9668	-2.56	-3.16	32 12 12.7

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Ch.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
Nov. 1.4	2 58 44.10	58 40.11	+15 35 38.7	35 22.1	-8.3486	-8.9668	-2.56	-3.16	d h m 1 12 12.7
2.4	2 58 11.90	58 7.90	15 33 25.1	33 8.5	8.3504	8.9687	2.46	3.08	2 12 8.2
3.4	2 57 39.58	57 35.58	15 31 10.9	30 54.3	8.3517	8.9703	2.33	2.98	3 12 3.7
4.4	2 57 7.17	57 3.18	15 28 56.3	28 39.7	8.3528	8.9713	2.16	-2.86	4 11 59.2
5.4	2 56 34.70	56 30.72	15 26 41.5	26 26.0	8.3536	8.9716	-1.86		5 11 54.7
6.4	2 56 2.18	55 58.21	15 24 26.6	24 10.2	8.3540	8.9719			6 11 50.2
7.4	2 55 29.64	55 25.68	15 22 11.6	21 55.2	8.3540	8.9719			7 11 45.7
8.4	2 54 57.11	54 53.16	15 19 56.6	19 40.3	8.3538	8.9716	+1.86		8 11 41.3
9.4	2 54 24.61	54 20.68	15 17 41.8	17 25.5	8.3532	8.9710	2.16	+2.86	9 11 36.9
10.4	2 53 52.18	53 48.27	15 15 27.3	15 11.1	8.3522	8.9697	2.33	2.98	10 11 32.4
11.4	2 53 19.83	53 15.95	15 13 13.3	12 57.2	8.3509	8.9681	2.46	3.08	11 11 28.0
12.4	2 52 47.60	52 43.75	15 10 59.8	10 43.8	8.3492	8.9661	2.56	3.16	12 11 23.5
13.4	2 52 15.50	52 11.68	15 8 46.9	8 31.0	8.3470	8.9638	2.63	3.24	13 11 19.1
14.4	2 51 43.57	51 39.78	15 6 34.7	6 18.9	8.3446	8.9612	2.68	3.31	14 11 14.6
15.3	2 51 11.83	51 8.07	15 4 23.4	4 7.7	8.3419	8.9586	2.72	3.36	15 11 10.1
16.3	2 50 40.30	50 36.58	15 2 13.0	1 57.5	8.3389	8.9555	2.76	3.41	16 11 5.6
17.3	2 50 8.99	50 5.31	14 60 3.7	59 48.4	8.3356	8.9522	2.80	3.45	17 11 1.2
18.3	2 49 37.93	49 34.29	14 57 55.5	57 40.4	8.3320	8.9482	2.83	3.49	18 10 56.7
19.3	2 49 7.15	49 3.55	14 55 48.6	55 33.7	8.3279	8.9434	2.86	3.53	19 10 52.3
20.3	2 48 36.67	48 33.12	14 53 43.1	53 28.4	8.3233	8.9382	2.89	3.56	20 10 47.8
21.3	2 48 6.52	48 3.02	14 51 39.0	51 24.5	8.3186	8.9329	2.92	3.59	21 10 43.3
22.3	2 47 36.71	47 33.26	14 49 36.5	49 22.3	8.3135	8.9272	2.95	3.62	22 10 38.9
23.3	2 47 7.26	47 3.86	14 47 35.6	47 21.6	8.3080	8.9211	2.98	3.65	23 10 34.5
24.3	2 46 38.19	46 34.84	14 45 36.5	45 22.8	8.3021	8.9146	3.00	3.67	24 10 30.1
25.3	2 46 9.53	46 6.24	14 43 39.3	43 25.9	8.2957	8.9076	3.02	3.69	25 10 25.7
26.3	2 45 41.30	45 38.07	14 41 44.1	41 31.0	8.2891	8.8996	3.04	3.71	26 10 21.3
27.3	2 45 13.51	45 10.34	14 39 50.9	39 38.1	8.2820	8.8912	3.06	3.73	27 10 16.9
28.3	2 44 46.18	44 43.07	14 37 59.9	37 47.4	8.2744	8.8823	3.08	3.75	28 10 12.6
29.3	2 44 19.34	44 16.29	14 36 11.2	35 59.0	8.2663	8.8731	3.10	3.77	29 10 8.2
30.3	2 43 53.01	43 50.03	14 34 24.8	34 12.9	8.2577	8.8632	3.12	3.79	30 10 3.8
Dec. 1.3	2 43 27.21	43 24.30	14 32 40.9	32 29.3	8.2488	8.8527	3.13	3.81	1 9 59.4
2.3	2 43 1.95	42 59.11	14 30 59.5	30 48.2	8.2394	8.8420	3.15	3.83	2 9 55.1
3.3	2 42 37.25	42 34.48	14 29 20.8	29 9.8	8.2294	8.8306	3.16	3.84	3 9 50.7
4.3	2 42 13.13	42 10.44	14 27 44.8	27 34.2	8.2186	8.8184	3.17	3.85	4 9 46.4
5.3	2 41 49.62	41 47.01	14 26 11.6	26 1.3	8.2071	8.8054	3.18	3.86	5 9 42.1
6.3	2 41 26.73	41 24.20	14 24 41.3	24 31.4	8.1953	8.7915	3.19	3.87	6 9 37.8
7.3	2 41 4.46	41 2.01	14 23 14.1	23 4.5	8.1830	8.7761	3.20	3.89	7 9 33.5
8.3	2 40 42.84	40 40.47	14 21 49.8	21 40.6	8.1700	8.7596	3.21	3.89	8 9 29.2
9.3	2 40 21.89	40 19.60	14 20 28.6	20 19.7	8.1559	8.7425	3.22	3.90	9 9 24.9
10.3	2 40 1.61	39 59.41	14 19 10.7	19 2.2	8.1416	8.7241	3.22	3.90	10 9 20.6
11.3	2 39 42.01	39 39.89	14 17 56.0	17 47.9	8.1260	8.7049	3.23	3.91	11 9 16.3
12.3	2 39 23.11	39 21.07	14 16 44.6	16 36.9	8.1100	8.6848	3.24	3.92	12 9 12.1
13.3	2 39 4.91	39 2.95	14 15 36.6	15 29.3	8.0930	8.6631	3.24	3.92	13 9 7.9
14.3	2 38 47.42	38 45.55	14 14 32.0	14 25.1	8.0753	8.6396	3.25	3.93	14 9 3.7
15.3	2 38 30.66	38 28.87	14 13 30.9	13 24.4	8.0564	8.6147	3.25	3.93	15 8 59.5
16.3	2 38 14.63	38 12.92	14 12 33.3	12 27.2	8.0364	8.5882	3.26	3.94	16 8 55.3
17.3	2 37 59.34	37 57.71	14 11 39.2	11 33.5	8.0154	8.5601	3.26	3.94	17 8 51.1
18.3	2 37 43.79	37 42.25	14 10 48.6	10 43.3	7.9929	8.5291	3.26	3.94	18 8 46.9
19.3	2 37 31.00	37 29.54	14 10 1.7	9 56.8	7.9690	8.4958	3.27	3.95	19 8 42.7
20.3	2 37 17.97	37 16.59	14 9 18.4	9 13.9	7.9434	8.4586	3.27	3.95	20 8 38.5
21.2	2 37 5.71	37 4.41	14 8 38.8	8 34.7	7.9161	8.4179	3.27	3.95	21 8 34.4
22.2	2 36 54.22	36 53.01	14 8 2.8	7 59.1	7.8864	8.3731	3.27	3.95	22 8 30.3
23.2	2 36 43.52	36 42.39	14 7 30.5	7 27.2	7.8548	8.3230	3.27	3.96	23 8 26.2
24.2	2 36 33.60	36 32.55	14 7 2.1	6 59.2	7.8202	8.2648	3.27	3.96	24 8 22.1
25.2	2 36 24.47	36 23.51	14 6 37.5	6 35.0	7.7831	8.1976	3.27	3.96	25 8 18.0
26.2	2 36 16.13	36 15.26	14 6 16.7	6 14.6	7.7414	8.1181	3.27	3.96	26 8 14.0
27.2	2 36 8.59	36 7.80	14 5 59.7	5 58.0	7.6953	8.0206	3.27	3.96	27 8 9.9
28.2	2 36 1.86	36 1.16	14 5 46.5	5 45.2	7.6430	7.8908	3.27	3.97	28 8 5.8
29.2	2 35 55.94	35 55.33	14 5 37.2	5 36.3	7.5835	7.7108	3.27	3.97	29 8 1.8
30.2	2 35 50.82	35 50.30	14 5 31.7	5 31.3	7.5146	-7.3857	3.27	3.97	30 7 57.8
31.2	2 35 46.52	35 46.09	14 5 30.1	5 30.1	7.4315	+6.4437	3.27	3.97	31 7 53.8
32.2	2 35 43.04	35 42.70	+14 5 32.4	5 32.9	-7.3287	+7.4751	+3.27	+3.97	32 7 49.8

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $a$ .		Log of $b$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
Jan. 0.2	16 42 24.27	42 43.47	20 40' 2.2	40 37.4	+8.2829	-8.547	-2.71	+3.22	0 21 57.5
1.2	16 42 51.82	43 10.93	20 40 52.6	41 27.3	8.2807	8.541	2.72	3.22	1 21 54.0
2.2	16 43 19.22	43 38.23	20 41 42.3	42 16.5	8.2782	8.534	2.72	3.23	2 21 50.6
3.2	16 43 46.46	44 5.37	20 42 31.2	43 4.9	8.2756	8.528	2.73	3.23	3 21 47.1
4.2	16 44 13.54	44 32.34	20 43 19.4	43 52.6	8.2729	8.521	2.73	3.23	4 21 43.6
5.2	16 44 40.45	44 59.13	20 44 6.8	44 39.5	8.2701	8.514	2.74	3.23	5 21 40.1
6.2	16 45 7.18	45 25.74	20 44 53.5	45 25.7	8.2672	8.508	2.74	3.23	6 21 36.6
7.2	16 45 33.73	45 52.17	20 45 39.5	46 11.2	8.2642	8.501	2.75	3.24	7 21 33.1
8.2	16 46 0.10	46 18.42	20 46 24.8	46 56.0	8.2613	8.494	2.75	3.24	8 21 29.6
9.2	16 46 26.29	46 44.48	20 47 9.4	47 40.1	8.2582	8.487	2.76	3.24	9 21 26.1
10.2	16 46 52.29	47 10.35	20 47 53.3	48 23.5	8.2549	8.480	2.76	3.24	10 21 22.6
11.2	16 47 18.09	47 36.02	20 48 36.4	49 6.2	8.2516	8.473	2.77	3.24	11 21 19.1
12.2	16 47 43.69	48 1.48	20 49 18.8	49 48.1	8.2481	8.465	2.77	3.25	12 21 15.6
13.2	16 48 9.08	48 26.72	20 50 0.4	50 29.2	8.2444	8.457	2.78	3.25	13 21 12.1
14.2	16 48 34.25	48 51.74	20 50 41.3	51 9.6	8.2406	8.449	2.78	3.25	14 21 8.6
15.2	16 48 59.20	49 16.54	20 51 21.5	51 49.2	8.2367	8.441	2.79	3.25	15 21 5.1
16.2	16 49 23.92	49 41.12	20 52 0.9	52 28.1	8.2328	8.433	2.79	3.25	16 21 1.5
17.2	16 49 48.42	50 5.47	20 52 39.6	53 6.3	8.2288	8.425	2.80	3.25	17 20 58.0
18.2	16 50 12.69	50 29.58	20 53 17.5	53 43.8	8.2246	8.416	2.80	3.25	18 20 54.5
19.2	16 50 36.72	50 53.44	20 53 54.7	54 20.5	8.2201	8.408	2.81	3.25	19 20 50.9
20.2	16 51 0.50	51 17.05	20 54 31.2	54 56.4	8.2156	8.399	2.81	3.25	20 20 47.4
21.2	16 51 24.03	51 40.40	20 55 6.9	55 31.6	8.2109	8.390	2.82	3.25	21 20 43.9
22.2	16 51 47.30	52 3.50	20 55 41.9	56 6.1	8.2061	8.381	2.82	3.24	22 20 40.3
23.2	16 52 10.32	52 26.34	20 56 16.1	56 39.8	8.2013	8.371	2.83	3.24	23 20 36.8
24.2	16 52 33.08	52 48.92	20 56 49.6	57 12.7	8.1963	8.361	2.83	3.24	24 20 33.2
25.2	16 52 55.58	53 11.24	20 57 22.3	57 44.9	8.1912	8.351	2.84	3.24	25 20 29.7
26.1	16 53 17.81	53 33.29	20 57 54.3	58 16.4	8.1859	8.341	2.84	3.24	26 20 26.1
27.1	16 53 39.77	53 55.06	20 58 25.5	58 47.1	8.1805	8.331	2.85	3.23	27 20 22.5
28.1	16 54 1.45	54 16.55	20 58 56.0	59 17.1	8.1749	8.321	2.85	3.23	28 20 19.0
29.1	16 54 22.85	54 37.75	20 59 25.8	59 46.4	8.1691	8.311	2.86	3.23	29 20 15.4
30.1	16 54 43.96	54 58.66	20 59 54.9	60 15.0	8.1631	8.300	2.86	3.23	30 20 11.8
31.1	16 55 4.78	55 19.28	21 0 23.0	0 42.9	8.1571	8.290	2.87	3.23	31 20 8.2
Feb. 1.1	16 55 25.31	55 39.60	21 0 51.0	1 10.1	8.1508	8.279	2.87	3.23	1 20 4.6
2.1	16 55 45.54	55 59.62	21 1 18.0	1 36.6	8.1443	8.267	2.88	3.23	2 20 1.0
3.1	16 56 5.46	56 19.34	21 1 44.3	2 2.4	8.1377	8.256	2.88	3.23	3 19 57.4
4.1	16 56 25.08	56 38.76	21 2 9.9	2 27.5	8.1310	8.243	2.89	3.23	4 19 53.8
5.1	16 56 44.40	56 57.86	21 2 34.7	2 51.8	8.1241	8.230	2.89	3.23	5 19 50.2
6.1	16 57 3.41	57 16.64	21 2 58.8	3 15.4	8.1168	8.217	2.90	3.22	6 19 46.5
7.1	16 57 22.09	57 35.09	21 3 22.2	3 38.3	8.1090	8.204	2.90	3.22	7 19 42.9
8.1	16 57 40.43	57 53.20	21 3 44.9	4 0.5	8.1011	8.190	2.91	3.22	8 19 39.3
9.1	16 57 58.44	58 10.97	21 4 6.8	4 21.9	8.0930	8.175	2.91	3.22	9 19 35.6
10.1	16 58 16.11	58 28.40	21 4 28.0	4 42.6	8.0847	8.161	2.92	3.22	10 19 32.0
11.1	16 58 33.44	58 45.49	21 4 48.5	5 2.7	8.0760	8.147	2.92	3.21	11 19 28.4
12.1	16 58 50.42	59 2.24	21 5 8.4	5 22.1	8.0672	8.133	2.93	3.21	12 19 24.7
13.1	16 59 7.06	59 18.65	21 5 27.6	5 40.8	8.0583	8.117	2.93	3.21	13 19 21.0
14.1	16 59 23.36	59 34.70	21 5 46.1	5 58.7	8.0491	8.099	2.94	3.21	14 19 17.4
15.1	16 59 39.31	59 50.39	21 6 3.8	6 15.9	8.0395	8.081	2.94	3.21	15 19 13.7
16.1	16 59 54.90	60 5.72	21 6 20.8	6 32.4	8.0293	8.063	2.95	3.20	16 19 10.0
17.1	17 0 10.12	0 20.68	21 6 37.1	6 48.3	8.0187	8.044	2.95	3.20	17 19 6.4
18.1	17 0 24.97	0 35.27	21 6 52.7	7 3.5	8.0079	8.026	2.95	3.20	18 19 2.7
19.1	17 0 39.45	0 49.49	21 7 7.7	7 18.1	7.9968	8.008	2.96	3.20	19 18 59.0
20.1	17 0 53.56	1 3.34	21 7 22.1	7 32.0	7.9854	7.989	2.96	3.20	20 18 55.3
21.1	17 1 7.30	1 16.81	21 7 35.8	7 45.2	7.9736	7.967	2.96	3.19	21 18 51.6
22.1	17 1 20.66	1 29.91	21 7 48.8	7 57.8	7.9612	7.945	2.96	3.19	22 18 47.8
23.1	17 1 33.64	1 42.63	21 8 1.2	8 9.7	7.9487	7.923	2.96	3.19	23 18 44.1
24.1	17 1 46.25	1 54.97	21 8 12.9	8 20.9	7.9358	7.899	2.97	3.19	24 18 40.4
25.1	17 1 58.48	2 6.92	21 8 24.0	8 31.4	7.9221	7.873	2.97	3.18	25 18 36.7
26.1	17 2 10.32	2 18.48	21 8 34.4	8 41.3	7.9078	7.846	2.97	3.18	26 18 32.9
27.1	17 2 21.77	2 29.65	21 8 44.2	8 50.6	7.8928	7.817	2.97	3.18	27 18 29.2
28.1	17 2 32.82	2 40.43	21 8 53.3	8 59.3	7.8773	7.786	2.98	3.18	28 18 25.4
29.1	17 2 43.48	2 50.82	21 9 1.8	9 7.4	7.8614	7.755	2.98	3.17	29 18 21.7
30.1	17 2 53.75	3 0.80	21 9 9.7	9 14.9	+7.8447	-7.722	-2.98	+3.17	30 18 17.9

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.			Apparent Declination.			Log of a.		Log of b.		Mean Solar Time of Meridian Transit.			
	At Sidereal Oh.		At Transit.	At Sidereal Oh.		At Transit.	In R. A.	In Dec.	In R. A.	In Dec.				
Mar.	d	h	m	s	m	s	°	'	°	'	d	h	m	
	1.1	17	2	43.48	2	50.82	-21	9	1.8	9	7.4	1	18	21.7
	2.1	17	2	53.75	3	0.80	21	9	9.7	9	14.9	2	18	17.9
	3.1	17	3	3.62	3	10.38	21	9	17.0	9	21.7	3	18	14.1
	4.0	17	3	13.08	3	19.55	21	9	23.7	9	27.9	3	16	10.3
	5.0	17	3	22.13	3	28.32	21	9	29.7	9	33.4	3	16	6.5
	6.0	17	3	30.78	3	36.68	21	9	35.0	9	38.3	3	16	2.7
	7.0	17	3	39.02	3	44.62	21	9	39.7	9	42.7	3	16	7.9
	8.0	17	3	46.84	3	52.14	21	9	43.9	9	46.5	3	15	8.1
	9.0	17	3	54.24	3	59.25	21	9	47.5	9	49.6	3	15	9.3
	10.0	17	4	1.23	4	5.94	21	9	50.5	9	52.1	3	15	10.7
	11.0	17	4	7.80	4	12.21	21	9	52.8	9	54.1	3	15	11.7
	12.0	17	4	13.94	4	18.05	21	9	54.6	9	55.5	3	14	12.7
	13.0	17	4	19.66	4	23.47	21	9	55.8	9	56.3	3	14	13.7
	14.0	17	4	24.96	4	28.46	21	9	56.4	9	56.5	3	14	14.7
	15.0	17	4	29.83	4	33.03	21	9	56.4	9	56.1	3	14	15.7
	16.0	17	4	34.28	4	37.18	21	9	55.9	9	55.1	3	13	16.7
	17.0	17	4	38.30	4	40.90	21	9	54.8	9	53.6	3	13	17.7
	18.0	17	4	41.89	4	44.19	21	9	53.1	9	51.5	3	13	18.7
	19.0	17	4	45.06	4	47.06	21	9	50.8	9	48.8	3	13	19.7
	20.0	17	4	47.80	4	49.50	21	9	47.9	9	45.6	3	12	20.7
	21.0	17	4	50.12	4	51.51	21	9	44.5	9	41.8	3	12	21.7
	22.0	17	4	52.01	4	53.10	21	9	40.6	9	37.5	3	12	22.7
	23.0	17	4	53.48	4	54.27	21	9	36.2	9	32.6	3	11	23.7
	24.0	17	4	54.53	4	55.01	21	9	31.2	9	27.2	3	11	24.7
	25.0	17	4	55.15	4	55.33	21	9	25.7	9	21.3	3	11	25.7
	26.0	17	4	55.35	4	55.23	21	9	19.6	9	14.9	3	10	26.7
	27.0	17	4	55.13	4	54.71	21	9	13.0	9	8.0	3	10	27.7
	28.0	17	4	54.48	4	53.76	21	9	5.9	9	0.6	3	10	28.7
	29.0	17	4	53.41	4	52.39	21	8	58.3	8	52.7	3	10	29.7
	30.0	17	4	51.92	4	50.61	21	8	50.2	8	44.2	3	10	30.7
Apr.	31.0	17	4	50.01	4	48.41	21	8	41.6	8	35.1	3	10	31.7
	1.0	17	4	47.69	4	45.79	21	8	32.4	8	25.5	3	10	32.7
	2.0	17	4	44.95	4	42.75	21	8	22.7	8	15.5	3	10	33.7
	3.0	17	4	41.79	4	39.29	21	8	12.6	8	5.0	3	10	34.7
	4.0	17	4	38.21	4	35.41	21	8	2.0	7	54.0	3	10	35.7
	5.0	17	4	34.22	4	31.12	21	7	50.9	7	42.6	3	10	36.7
	6.0	17	4	29.81	4	26.42	21	7	39.3	7	30.7	3	10	37.7
	7.0	17	4	24.99	4	21.32	21	7	27.2	7	18.3	3	10	38.7
	8.0	17	4	19.77	4	15.81	21	7	14.7	7	5.4	3	10	39.7
	9.0	17	4	14.14	4	9.90	21	7	1.7	6	52.0	3	10	40.7
	9.9	17	4	8.11	4	3.58	21	6	48.2	6	38.2	3	10	41.7
	10.9	17	4	1.68	3	56.86	21	6	34.2	6	23.9	3	10	42.7
	11.9	17	3	54.85	3	49.75	21	6	19.7	6	9.1	3	10	43.7
	12.9	17	3	47.63	3	42.25	21	6	4.8	5	53.9	3	10	44.7
	13.9	17	3	40.02	3	34.37	21	5	49.5	5	38.3	3	10	45.7
	14.9	17	3	32.02	3	26.11	21	5	33.7	5	22.3	3	10	46.7
	15.9	17	3	23.65	3	17.48	21	5	17.5	5	5.8	3	10	47.7
	16.9	17	3	14.91	3	8.48	21	5	0.9	4	48.0	3	10	48.7
	17.9	17	3	5.80	2	59.11	21	4	43.8	4	31.5	3	10	49.7
	18.9	17	2	56.33	2	49.37	21	4	26.3	4	13.7	3	10	50.7
	19.9	17	2	46.49	2	39.27	21	4	8.4	3	55.5	3	10	51.7
	20.9	17	2	36.29	2	28.83	21	3	50.1	3	36.9	3	10	52.7
	21.9	17	2	25.74	2	18.04	21	3	31.4	3	17.9	3	10	53.7
	22.9	17	2	14.85	2	6.91	21	3	12.3	2	58.6	3	10	54.7
	23.9	17	2	3.62	1	55.45	21	2	52.9	2	38.9	3	10	55.7
	24.9	17	1	52.06	1	43.66	21	2	33.1	2	18.8	3	10	56.7
	25.9	17	1	40.17	1	31.54	21	2	12.9	1	58.3	3	10	57.7
	26.9	17	1	27.96	1	19.10	21	1	52.3	1	37.5	3	10	58.7
	27.9	17	1	15.43	1	6.35	21	1	31.4	1	16.4	3	10	59.7
	28.9	17	1	2.58	0	53.29	21	1	10.1	0	54.9	3	10	60.7
	29.9	17	0	49.43	0	39.93	21	0	48.5	0	33.0	3	10	61.7
	30.9	17	0	35.98	0	26.27	-21	0	26.5	0	10.7	3	10	62.7

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of <i>a</i> .		Log of <i>b</i> .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Ch.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
May	d h m s	m s	° ′ ″	° ′ ″					d h m
	1.9 17 0 22.23	0 12.32	20 60 4.1	59 48.1	-7.9843	+8.195	-2.83	+2.85	2 14 15.3
	2.9 16 60 8.20	59 58.09	20 59 41.4	59 25.2	7.9930	8.201	2.82	2.84	3 14 11.1
	3.9 16 59 53.89	59 43.59	20 59 18.4	59 2.0	8.0014	8.206	2.81	2.83	4 14 6.9
	4.9 16 59 39.31	59 28.82	20 58 55.1	58 38.5	8.0094	8.211	2.80	2.82	5 14 2.7
	5.9 16 59 24.46	59 13.79	20 58 31.6	58 14.7	8.0173	8.216	2.79	2.81	6 13 58.6
	6.9 16 59 9.34	58 58.50	20 58 7.8	57 50.6	8.0248	8.222	2.78	2.80	7 13 54.4
	7.9 16 58 53.97	58 42.96	20 57 43.6	57 26.2	8.0318	8.228	2.77	2.79	8 13 50.2
	8.9 16 58 38.35	58 27.18	20 57 19.1	57 1.5	8.0385	8.233	2.76	2.78	9 13 46.0
	9.9 16 58 22.50	58 11.17	20 56 54.3	56 36.6	8.0447	8.238	2.74	2.77	10 13 41.8
	10.9 16 58 6.43	57 54.94	20 56 29.3	56 11.5	8.0506	8.241	2.72	2.76	11 13 37.6
	11.9 16 57 50.14	57 38.50	20 56 4.1	55 46.2	8.0563	8.245	2.70	2.75	12 13 33.4
	12.9 16 57 33.64	57 21.85	20 55 38.7	55 20.6	8.0619	8.248	2.69	2.74	13 13 29.2
	13.9 16 57 16.93	57 5.01	20 55 13.1	54 54.8	8.0671	8.252	2.67	2.72	14 13 25.0
	14.9 16 57 0.03	56 47.99	20 54 47.2	54 28.8	8.0718	8.256	2.65	2.70	15 13 20.8
	15.8 16 56 42.95	56 30.79	20 54 21.1	54 2.6	8.0763	8.260	2.63	+2.68	16 13 16.6
	16.8 16 56 25.70	56 13.42	20 53 54.8	53 36.2	8.0806	8.263	2.61		17 13 12.3
	17.8 16 56 8.28	55 55.89	20 53 28.3	53 9.6	8.0847	8.266	2.58		18 13 8.1
	18.8 16 55 50.70	55 38.21	20 53 1.6	52 42.8	8.0885	8.269	2.55		19 13 3.9
	19.8 16 55 32.97	55 20.38	20 52 34.8	52 15.9	8.0921	8.271	2.52		20 12 59.6
	20.8 16 55 15.10	55 2.42	20 52 7.9	51 48.9	8.0955	8.272	2.49		21 12 55.4
	21.8 16 54 57.09	54 44.33	20 51 40.9	51 21.8	8.0986	8.274	2.46		22 12 51.2
	22.8 16 54 38.96	54 26.13	20 51 13.8	50 54.6	8.1014	8.276	2.43		23 12 46.9
	23.8 16 54 20.72	54 7.83	20 50 46.5	50 27.3	8.1037	8.278	2.40		24 12 42.7
	24.8 16 54 2.39	53 49.44	20 50 19.1	49 59.9	8.1059	8.279	2.37		25 12 38.5
	25.8 16 53 43.97	53 30.96	20 49 51.7	49 32.4	8.1080	8.280	2.33		26 12 34.2
	26.8 16 53 25.46	53 12.39	20 49 24.2	49 4.8	8.1100	8.282	2.29		27 12 30.0
	27.8 16 53 6.87	52 53.75	20 48 56.6	48 37.2	8.1117	8.283	2.23		28 12 25.7
	28.8 16 52 48.21	52 35.05	20 48 29.0	48 9.6	8.1132	8.283	2.16		29 12 21.5
	29.8 16 52 29.49	52 16.30	20 48 1.4	47 42.0	8.1145	8.283	2.08		30 12 17.3
	30.8 16 52 10.72	51 57.50	20 47 33.8	47 14.4	8.1157	8.283	1.98		31 12 13.0
June	31.8 16 51 51.90	51 38.67	20 47 6.2	46 46.8	8.1166	8.283	1.86		32 12 8.8
	1.8 16 51 33.05	51 19.82	20 46 38.6	46 19.2	8.1171	8.283	-1.68		2 12 4.5
	2.8 16 51 14.19	51 0.95	20 46 11.0	45 51.6	8.1173	8.283			3 12 0.3
	3.8 16 50 55.32	50 42.07	20 45 43.4	45 24.1	8.1175	8.282			4 11 56.0
	4.8 16 50 36.44	50 23.20	20 45 15.9	44 56.7	8.1175	8.280			5 11 51.8
	5.8 16 50 17.57	50 4.35	20 44 48.5	44 29.4	8.1172	8.279	+1.68		6 11 47.5
	6.8 16 49 58.72	49 45.52	20 44 21.2	44 2.2	8.1166	8.277	1.86		7 11 43.3
	7.8 16 49 39.90	49 26.72	20 43 54.0	43 35.1	8.1159	8.275	1.98		8 11 39.1
	8.8 16 49 21.11	49 7.96	20 43 26.9	43 8.1	8.1151	8.273	2.08		9 11 34.8
	9.8 16 49 2.36	48 49.26	20 43 0.0	42 41.3	8.1139	8.270	2.16	-2.68	10 11 30.6
	10.8 16 48 43.67	48 30.62	20 42 33.3	42 14.6	8.1124	8.267	2.23	2.71	11 11 26.3
	11.8 16 48 25.07	48 12.06	20 42 6.7	41 48.1	8.1107	8.265	2.29	2.74	12 11 22.1
	12.8 16 48 6.51	47 53.58	20 41 40.3	41 21.8	8.1087	8.262	2.34	2.77	13 11 17.9
	13.8 16 47 48.06	47 35.20	20 41 14.1	40 55.8	8.1066	8.258	2.38	2.80	14 11 13.6
	14.8 16 47 29.70	47 16.92	20 40 48.1	40 30.1	8.1043	8.254	2.42	2.83	15 11 9.4
	15.8 16 47 11.44	46 58.75	20 40 22.4	40 4.7	8.1017	8.249	2.46	2.86	16 11 5.2
	16.8 16 46 53.30	46 40.69	20 39 57.0	39 39.5	8.0988	8.244	2.49	2.89	17 11 0.9
	17.8 16 46 35.28	46 22.76	20 39 31.9	39 14.6	8.0958	8.239	2.52	2.92	18 10 56.7
	18.8 16 46 17.39	46 4.97	20 39 7.1	38 50.0	8.0925	8.233	2.53	2.94	19 10 52.5
	19.8 16 45 59.64	45 47.33	20 38 42.6	38 25.7	8.0890	8.228	2.57	2.96	20 10 48.2
	20.8 16 45 42.04	45 29.84	20 38 18.4	38 1.8	8.0852	8.222	2.59	2.98	21 10 44.0
	21.7 16 45 24.60	45 12.51	20 37 54.6	37 38.2	8.0812	8.215	2.61	3.00	22 10 39.8
	22.7 16 45 7.32	44 55.35	20 37 31.2	37 15.0	8.0770	8.208	2.63	3.02	23 10 35.6
	23.7 16 44 50.21	44 38.37	20 37 8.1	36 52.2	8.0726	8.201	2.65	3.04	24 10 31.4
	24.7 16 44 33.28	44 21.58	20 36 45.4	36 29.8	8.0679	8.194	2.67	3.05	25 10 27.1
	25.7 16 44 16.54	44 4.98	20 36 23.1	36 7.8	8.0628	8.186	2.68	3.06	26 10 22.9
	26.7 16 44 0.00	43 48.58	20 36 1.2	35 46.2	8.0575	8.178	2.70	3.07	27 10 18.7
	27.7 16 43 43.66	43 32.39	20 35 39.7	35 25.1	8.0521	8.169	2.72	3.08	28 10 14.5
	28.7 16 43 27.53	43 16.42	20 35 18.7	35 4.4	8.0463	8.159	2.74	3.09	29 10 10.3
	29.7 16 43 11.62	43 0.67	20 34 58.2	34 44.2	8.0403	8.148	2.75	3.10	30 10 6.1
	30.7 16 42 55.93	42 45.14	20 34 38.2	34 24.5	8.0341	8.137	2.76	3.11	31 10 1.9
	31.7 16 42 40.47	42 29.85	20 34 18.7	34 5.3	-8.0273	+8.126	+2.77	-3.12	32 9 57.8

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.			Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.		
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.		d	h	m
July 1.7	16 42 40.47	42 29.85	-20 34 18.7	34 5.3	-8.0273	+8.126	+2.77	-3.12		2	9	57.8
2.7	16 42 25.26	42 14.81	20 33 59.7	33 46.7	8.0202	8.115	2.78	3.13		3	9	53.6
3.7	16 42 10.30	42 0.03	20 33 41.2	33 28.6	8.0129	8.102	2.79	3.14		4	9	49.4
4.7	16 41 55.59	41 45.51	20 33 23.3	33 11.1	8.0054	8.088	2.80	3.15		5	9	45.2
5.7	16 41 41.14	41 31.25	20 33 5.9	32 54.1	7.9974	8.074	2.81	3.16		6	9	41.1
6.7	16 41 26.96	41 17.27	20 32 49.1	32 37.7	7.9890	8.060	2.82	3.17		7	9	36.9
7.7	16 41 13.06	41 3.57	20 32 32.8	32 21.8	7.9801	8.046	2.83	3.18		8	9	32.7
8.7	16 40 59.45	40 50.16	20 32 17.1	32 6.6	7.9708	8.028	2.84	3.19		9	9	28.6
9.7	16 40 46.13	40 37.05	20 32 2.1	31 52.1	7.9612	8.008	2.85	3.19		10	9	24.4
10.7	16 40 33.11	40 24.24	20 31 47.8	31 38.2	7.9512	7.988	2.86	3.20		11	9	20.3
11.7	16 40 20.39	40 11.73	20 31 34.1	31 25.0	7.9410	7.967	2.87	3.21		12	9	16.2
12.7	16 40 7.97	39 59.54	20 31 21.1	31 12.4	7.9301	7.946	2.88	3.22		13	9	12.0
13.7	16 39 55.87	39 47.67	20 31 8.7	31 0.4	7.9185	7.924	2.89	3.23		14	9	7.9
14.7	16 39 44.10	39 36.12	20 30 56.9	30 49.1	7.9063	7.900	2.89	3.23		15	9	3.8
15.7	16 39 32.66	39 24.90	20 30 45.8	30 38.6	7.8939	7.871	2.90	3.24		16	8	59.6
16.7	16 39 21.54	39 14.01	20 30 35.5	30 28.8	7.8812	7.840	2.91	3.24		17	8	55.5
17.7	16 39 10.75	39 3.46	20 30 25.9	30 19.7	7.8678	7.808	2.92	3.25		18	8	51.4
18.7	16 39 0.30	38 53.26	20 30 17.0	30 11.3	7.8534	7.771	2.92	3.25		19	8	47.3
19.7	16 38 50.20	38 43.40	20 30 8.9	30 3.7	7.8384	7.731	2.93	3.26		20	8	43.2
20.7	16 38 40.45	38 33.89	20 30 1.5	29 56.8	7.8228	7.687	2.93	3.26		21	8	39.1
21.7	16 38 31.05	38 24.73	20 29 54.9	29 50.7	7.8066	7.638	2.94	3.27		22	8	35.1
22.7	16 38 22.00	38 15.93	20 29 49.0	29 45.3	7.7896	7.582	2.94	3.27		23	8	31.0
23.7	16 38 13.31	38 7.50	20 29 43.9	29 40.7	7.7713	7.518	2.94	3.28		24	8	26.9
24.7	16 38 4.99	37 59.43	20 29 39.5	29 36.9	7.7523	7.444	2.95	3.28		25	8	22.8
25.7	16 37 57.03	37 51.73	20 29 35.9	29 33.9	7.7323	7.347	2.95	3.29		26	8	18.8
26.7	16 37 49.44	37 44.40	20 29 33.1	29 31.7	7.7109	7.222	2.95	3.29		27	8	14.7
27.6	16 37 42.23	37 37.45	20 29 31.1	29 30.3	7.6883	7.046	2.96	3.29		28	8	10.7
28.6	16 37 35.39	37 30.87	20 29 29.9	29 29.6	7.6645	6.745	2.96	3.30		29	8	6.6
29.6	16 37 28.93	37 24.67	20 29 29.5	29 29.6	7.6393	+5.541	2.96	3.30		30	8	2.6
30.6	16 37 22.84	37 18.85	20 29 29.8	29 30.4	7.6121	-6.687	2.97	3.30		31	7	58.6
Aug. 31.6	16 37 17.14	37 13.42	20 29 30.9	29 32.1	7.5824	7.032	2.97	3.31		32	7	54.5
1.6	16 37 11.83	37 8.38	20 29 32.9	29 34.7	7.5505	7.222	2.97	3.31		2	7	50.5
2.6	16 37 6.91	37 3.74	20 29 35.7	29 38.1	7.5156	7.354	2.98	3.31		3	7	46.5
3.6	16 37 2.39	36 59.49	20 29 39.4	29 42.4	7.4776	7.454	2.98	3.31		4	7	42.5
4.6	16 36 58.26	36 55.63	20 29 43.9	29 47.5	7.4366	7.536	2.98	3.31		5	7	38.5
5.6	16 36 54.52	36 52.17	20 29 49.3	29 53.4	7.3906	7.605	2.99	3.32		6	7	34.5
6.6	16 36 51.18	36 49.11	20 29 55.5	30 0.1	7.3379	7.661	2.99	3.32		7	7	30.6
7.6	16 36 48.25	36 46.46	20 30 2.5	30 7.7	7.2770	7.711	2.99	3.32		8	7	26.6
8.6	16 36 45.73	36 44.22	20 30 10.3	30 16.1	7.2062	7.755	2.99	3.32		9	7	22.6
9.6	16 36 43.62	36 42.39	20 30 18.9	30 25.3	7.1227	7.798	3.00	3.32		10	7	18.6
10.6	16 36 41.91	36 40.97	20 30 28.4	30 35.3	7.0192	7.837	3.00	3.32		11	7	14.7
11.6	16 36 40.61	36 39.95	20 30 38.7	30 46.2	6.8811	7.873	3.00	3.32		12	7	10.7
12.6	16 36 39.72	36 39.34	20 30 49.9	30 58.0	6.6773	7.906	3.00	3.32		13	7	6.8
13.6	16 36 39.24	36 39.14	20 31 1.9	31 10.7	-6.2810	7.937	3.00	3.32		14	7	2.9
14.6	16 36 39.17	36 39.35	20 31 14.8	31 24.2	+5.9556	7.965	3.00	3.31		15	6	58.9
15.6	16 36 39.50	36 39.97	20 31 28.5	31 38.5	6.5700	7.991	3.00	3.31		16	6	55.0
16.6	16 36 40.24	36 41.00	20 31 43.0	31 53.6	6.8171	8.016	3.00	3.31		17	6	51.1
17.6	16 36 41.39	36 42.43	20 31 58.4	32 9.5	6.9736	8.040	3.00	3.31		18	6	47.2
18.6	16 36 42.95	36 44.27	20 32 14.6	32 26.2	7.0884	8.062	3.00	3.31		19	6	43.3
19.6	16 36 44.92	36 46.52	20 32 31.6	32 43.8	7.1791	8.082	3.00	3.30		20	6	39.4
20.6	16 36 47.30	36 49.18	20 32 49.4	33 2.2	7.2533	8.102	3.00	3.30		21	6	35.5
21.6	16 36 50.08	36 52.25	20 33 8.0	33 21.4	7.3166	8.120	3.00	3.30		22	6	31.6
22.6	16 36 53.27	36 55.72	20 33 27.4	33 41.4	7.3725	8.138	3.00	3.30		23	6	27.7
23.6	16 36 56.87	36 59.60	20 33 47.6	34 2.2	7.4214	8.156	3.00	3.29		24	6	23.9
24.6	16 37 0.87	37 3.88	20 34 8.7	34 23.7	7.4654	8.173	3.00	3.29		25	6	20.0
25.6	16 37 5.28	37 8.57	20 34 30.5	34 46.0	7.5053	8.188	3.00	3.28		26	6	16.2
26.6	16 37 10.09	37 13.66	20 34 53.1	35 9.1	7.5419	8.202	2.99	3.28		27	6	12.3
27.6	16 37 15.31	37 19.16	20 35 16.4	35 32.9	7.5756	8.215	2.99	3.27		28	6	8.5
28.6	16 37 20.93	37 25.06	20 35 40.4	35 57.5	7.6066	8.229	2.99	3.27		29	6	4.7
29.6	16 37 26.95	37 31.36	20 36 5.2	36 22.9	7.6354	8.243	2.99	3.26		30	6	0.8
30.6	16 37 33.37	37 38.06	20 36 30.8	36 49.0	7.6628	8.256	2.99	3.26		31	5	57.0
31.6	16 37 40.20	37 45.17	-20 36 57.1	37 15.8	+7.6886	-8.268	+2.98	-3.25		32	5	53.2

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $a$ .		Log of $b$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
Sept. 1 <sup>d</sup>	h m s	m s	° ' " d	' " d					d h m
1.6	16 37 47.43	37 52.67	20 37 24.2	37 43.4	+7.7123	-8.280	+2.98	-3.25	2 5 49.4
2.5	16 37 55.05	38 0.57	20 37 52.0	38 11.8	7.7348	8.292	2.98	3.24	3 5 45.6
3.5	16 38 3.07	38 8.87	20 38 20.6	38 40.9	7.7565	8.303	2.98	3.23	4 5 41.8
4.5	16 38 11.49	38 17.57	20 38 49.9	39 10.7	7.7771	8.314	2.98	3.23	5 5 38.0
5.5	16 38 20.31	38 26.66	20 39 19.9	39 41.1	7.7966	8.324	2.97	3.22	6 5 34.2
6.5	16 38 29.52	38 36.14	20 39 50.6	40 12.2	7.8150	8.333	2.97	3.21	7 5 30.5
7.5	16 38 39.12	38 46.00	20 40 21.9	40 44.0	7.8324	8.342	2.97	3.20	8 5 26.7
8.5	16 38 49.10	38 56.26	20 40 53.9	41 16.5	7.8492	8.352	2.97	3.19	9 5 22.9
9.5	16 38 59.47	39 6.89	20 41 26.6	41 49.6	7.8655	8.360	2.96	3.18	10 5 19.2
10.5	16 39 10.23	39 17.92	20 41 59.9	42 23.3	7.8812	8.368	2.96	3.17	11 5 15.4
11.5	16 39 21.38	39 29.34	20 42 33.8	42 57.7	7.8963	8.376	2.96	3.16	12 5 11.7
12.5	16 39 32.91	39 41.14	20 43 8.4	43 32.8	7.9106	8.385	2.96	3.15	13 5 7.9
13.5	16 39 44.82	39 53.31	20 43 43.7	44 8.5	7.9242	8.393	2.95	3.14	14 5 4.2
14.5	16 39 57.10	40 5.84	20 44 19.6	44 44.7	7.9372	8.400	2.95	3.13	15 5 0.5
15.5	16 40 9.74	40 18.74	20 44 56.0	45 21.5	7.9497	8.406	2.95	3.12	16 4 56.8
16.5	16 40 22.75	40 32.00	20 45 32.9	45 58.8	7.9619	8.412	2.94	3.11	17 4 53.1
17.5	16 40 36.12	40 45.62	20 46 10.4	46 36.7	7.9736	8.419	2.94	3.10	18 4 49.3
18.5	16 40 49.85	40 59.60	20 46 48.4	47 15.1	7.9850	8.425	2.94	3.09	19 4 45.6
19.5	16 41 3.94	41 13.94	20 47 27.0	47 54.1	7.9961	8.431	2.93	3.08	20 4 42.0
20.5	16 41 18.39	41 28.64	20 48 6.1	48 33.6	8.0067	8.437	2.93	3.07	21 4 38.3
21.5	16 41 33.19	41 43.69	20 48 45.8	49 13.7	8.0170	8.443	2.92	3.06	22 4 34.6
22.5	16 41 48.34	41 59.09	20 49 26.0	49 54.2	8.0270	8.448	2.92	3.05	23 4 30.9
23.5	16 42 3.84	42 14.83	20 50 6.6	50 35.1	8.0367	8.452	2.91	3.04	24 4 27.2
24.5	16 42 19.68	42 30.91	20 50 47.6	51 16.5	8.0460	8.457	2.91	3.02	25 4 23.6
25.5	16 42 35.86	42 47.33	20 51 29.1	51 58.3	8.0552	8.462	2.90	3.01	26 4 19.9
26.5	16 42 52.38	43 4.08	20 52 11.1	52 40.6	8.0640	8.467	2.90	2.99	27 4 16.3
27.5	16 43 9.23	43 21.17	20 52 53.5	53 23.4	8.0726	8.472	2.90	2.98	28 4 12.6
28.5	16 43 26.42	43 38.59	20 53 36.4	54 6.6	8.0811	8.476	2.89	2.97	29 4 9.0
29.5	16 43 43.94	43 56.34	20 54 19.7	54 50.1	8.0892	8.480	2.89	2.95	30 4 5.3
30.5	16 44 1.79	44 14.42	20 55 3.3	55 34.0	8.0972	8.483	2.89	2.94	31 4 1.7
Oct. 1.5	16 44 19.96	44 32.82	20 55 47.3	56 18.2	8.1048	8.487	2.88	2.93	2 3 58.1
2.5	16 44 38.45	44 51.54	20 56 31.7	57 2.8	8.1123	8.490	2.88	2.91	3 3 54.5
3.5	16 44 57.26	45 10.58	20 57 16.4	57 47.8	8.1197	8.493	2.88	2.90	4 3 50.8
4.5	16 45 16.39	45 29.93	20 58 1.4	58 33.1	8.1269	8.497	2.87	2.88	5 3 47.2
5.5	16 45 35.83	45 49.58	20 58 46.8	59 18.7	8.1337	8.500	2.87	2.87	6 3 43.6
6.5	16 45 55.57	46 9.54	20 59 32.5	60 4.6	8.1403	8.503	2.87	2.86	7 3 40.0
7.5	16 46 15.61	46 29.80	21 0 18.5	0 50.8	8.1468	8.506	2.86	2.84	8 3 36.4
8.5	16 46 35.95	46 50.36	21 1 4.8	1 37.3	8.1532	8.509	2.86	2.82	9 3 32.8
9.4	16 46 56.59	47 11.21	21 1 51.4	2 24.1	8.1595	8.511	2.85	2.80	10 3 29.3
10.4	16 47 17.53	47 32.35	21 2 38.2	3 11.1	8.1655	8.513	2.84	2.79	11 3 25.7
11.4	16 47 38.75	47 53.77	21 3 25.2	3 58.2	8.1711	8.515	2.83	2.77	12 3 22.1
12.4	16 48 0.24	48 15.46	21 4 12.4	4 45.5	8.1767	8.516	2.82	2.75	13 3 18.5
13.4	16 48 22.01	48 37.43	21 4 59.7	5 33.0	8.1822	8.517	2.81	2.74	14 3 15.0
14.4	16 48 44.05	48 59.67	21 5 47.2	6 20.7	8.1875	8.519	2.81	2.72	15 3 11.4
15.4	16 49 6.36	49 22.17	21 6 34.9	7 8.6	8.1928	8.521	2.80	2.70	16 3 7.8
16.4	16 49 28.94	49 44.93	21 7 22.8	7 56.6	8.1979	8.523	2.79	-2.68	17 3 4.3
17.4	16 49 51.78	50 7.95	21 8 10.9	8 44.8	8.2027	8.525	2.78		18 3 0.7
18.4	16 50 14.87	50 31.22	21 8 59.2	9 33.1	8.2074	8.526	2.78		19 2 57.2
19.4	16 50 38.21	50 54.74	21 9 47.6	10 21.5	8.2121	8.526	2.77		20 2 53.7
20.4	16 51 1.80	51 18.51	21 10 36.0	11 9.9	8.2167	8.526	2.76		21 2 50.1
21.4	16 51 25.64	51 42.53	21 11 24.4	11 58.4	8.2211	8.526	2.75		22 2 46.6
22.4	16 51 49.72	52 6.79	21 12 12.8	12 46.9	8.2255	8.527	2.75		23 2 43.1
23.4	16 52 14.04	52 31.28	21 13 1.3	13 35.5	8.2296	8.527	2.74		24 2 39.5
24.4	16 52 38.59	52 55.99	21 13 49.8	14 24.1	8.2336	8.528	2.73		25 2 36.0
25.4	16 53 3.36	53 20.93	21 14 38.4	15 12.7	8.2376	8.528	2.72		26 2 32.5
26.4	16 53 28.36	53 46.10	21 15 27.0	16 1.3	8.2416	8.528	2.71		27 2 29.0
27.4	16 53 53.59	54 11.49	21 16 15.6	16 49.9	8.2454	8.529	2.71		28 2 25.5
28.4	16 54 19.04	54 37.10	21 17 4.3	17 38.5	8.2491	8.529	2.70		29 2 22.0
29.4	16 54 44.70	55 2.92	21 17 52.9	18 27.1	8.2527	8.528	2.69		30 2 18.5
30.4	16 55 10.57	55 28.94	21 18 41.5	19 15.6	8.2561	8.528	2.68		31 2 15.0
31.4	16 55 36.64	55 55.16	21 19 30.0	20 4.1	8.2594	8.527	2.67		32 2 11.5
32.4	16 56 2.91	56 21.58	21 20 18.4	20 52.5	+8.2627	-8.526	+2.67		33 2 8.0

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Ch.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
	d h m s	m s	° ' "	' "					d h m
Nov. 1.4	16 56 2.91	56 21.58	-21 20 18.4	20 52.5	+8.2627	-8.526	+2.67		2 2 8.0
2.4	16 56 29.38	56 48.19	21 21 6.7	21 40.8	8.2660	8.526	2.66		3 2 4.5
3.4	16 56 56.05	57 14.99	21 21 55.0	22 29.0	8.2691	8.525	2.65		4 2 1.0
4.4	16 57 22.90	57 41.97	21 22 43.2	23 17.1	8.2720	8.524	2.64		5 1 57.5
5.4	16 57 49.92	58 9.13	21 23 31.2	24 5.1	8.2748	8.522	2.63		6 1 54.0
6.4	16 58 17.12	58 36.46	21 24 19.1	24 52.9	8.2776	8.521	2.62	+2.68	7 1 50.5
7.4	16 58 44.49	59 3.96	21 25 6.8	25 40.5	8.2803	8.519	2.61	2.70	8 1 47.1
8.4	16 59 12.03	59 31.63	21 25 54.3	26 27.9	8.2829	8.517	2.60	2.72	9 1 43.6
9.4	16 59 39.73	59 59.46	21 26 41.6	27 15.2	8.2854	8.516	2.59	2.74	10 1 40.1
10.4	17 0 7.59	0 27.44	21 27 28.8	28 2.3	8.2879	8.515	2.58	2.76	11 1 36.7
11.4	17 0 35.61	0 55.57	21 28 15.9	28 49.2	8.2903	8.514	2.56	2.78	12 1 33.2
12.4	17 1 3.78	1 23.85	21 29 2.8	29 35.9	8.2925	8.511	2.54	2.80	13 1 29.7
13.4	17 1 32.09	1 52.26	21 29 49.4	30 22.4	8.2946	8.509	2.53	2.82	14 1 26.3
14.3	17 2 0.53	2 20.80	21 30 35.8	31 8.6	8.2966	8.507	2.52	2.84	15 1 22.8
15.3	17 2 29.10	2 49.47	21 31 21.9	31 54.5	8.2985	8.504	2.50	2.86	16 1 19.4
16.3	17 2 57.79	3 18.27	21 32 7.7	32 40.1	8.3004	8.501	2.48	2.88	17 1 15.9
17.3	17 3 26.61	3 47.19	21 32 53.2	33 25.5	8.3022	8.499	2.46	2.89	18 1 12.5
18.3	17 3 55.55	4 16.22	21 33 38.5	34 10.6	8.3040	8.496	2.45	2.90	19 1 9.0
19.3	17 4 24.61	4 45.36	21 34 23.5	34 55.4	8.3057	8.493	2.43	2.91	20 1 5.6
20.3	17 4 53.78	5 14.61	21 35 8.2	35 39.9	8.3073	8.490	2.42	2.92	21 1 2.1
21.3	17 5 23.05	5 43.97	21 35 52.6	36 24.0	8.3089	8.487	2.40	2.93	22 0 58.7
22.3	17 5 52.43	6 13.43	21 36 36.6	37 7.8	8.3104	8.484	2.38	2.94	23 0 55.2
23.3	17 6 21.91	6 42.98	21 37 20.3	37 51.3	8.3118	8.481	2.37	2.95	24 0 51.8
24.3	17 6 51.48	7 12.62	21 38 3.7	38 34.5	8.3131	8.478	2.35	2.96	25 0 48.4
25.3	17 7 21.13	7 42.35	21 38 46.8	39 17.3	8.3143	8.474	2.33	2.97	26 0 44.9
26.3	17 7 50.87	8 12.16	21 39 29.5	39 59.7	8.3156	8.470	2.31	2.98	27 0 41.5
27.3	17 8 20.69	8 42.05	21 40 11.8	40 41.7	8.3167	8.466	2.29	2.99	28 0 38.1
28.3	17 8 50.59	9 12.01	21 40 53.7	41 23.3	8.3178	8.462	2.26	3.00	29 0 34.6
29.3	17 9 20.56	9 42.03	21 41 35.2	42 4.6	8.3188	8.458	2.22	3.00	30 0 31.2
30.3	17 9 50.59	10 12.11	21 42 16.4	42 45.6	8.3196	8.454	2.18	3.01	31 0 27.8
Dec. 1.3	17 10 20.67	10 42.25	21 42 57.2	43 26.2	8.3204	8.451	2.13	3.02	2 0 24.3
2.3	17 10 50.81	11 12.44	21 43 37.7	44 6.4	8.3212	8.447	2.08	3.02	3 0 20.9
3.3	17 11 21.01	11 42.67	21 44 17.8	44 46.2	8.3219	8.442	2.03	3.03	4 0 17.5
4.3	17 11 51.25	12 12.94	21 44 57.4	45 25.5	8.3224	8.437	1.98	3.04	5 0 14.0
5.3	17 12 21.52	12 43.24	21 45 36.5	46 4.3	8.3229	8.432	1.92	3.04	6 0 10.6
6.3	17 12 51.82	13 13.58	21 46 15.2	46 42.7	8.3233	8.427	1.85	3.05	7 0 7.2
7.3	17 13 22.15	13 43.95	21 46 53.5	47 20.6	8.3237	8.422	1.77	3.05	8 0 3.7
8.3	17 13 52.51	14 14.33	21 47 31.3	47 58.1	8.3240	8.416	+1.68	3.06	9 0 0.3
9.3	17 14 22.88	14 44.72	21 48 8.6	48 35.1	8.3242	8.411		3.06	9 23 56.9
10.3	17 14 53.26	15 15.11	21 48 45.5	49 11.7	8.3242	8.406		3.07	10 23 53.4
11.3	17 15 23.64	15 45.50	21 49 21.9	49 47.9	8.3243	8.400		3.07	11 23 50.0
12.3	17 15 54.03	16 15.89	21 49 57.9	50 23.6	8.3244	8.395		3.08	12 23 46.6
13.3	17 16 24.42	16 46.28	21 50 33.4	50 58.8	8.3243	8.389		3.08	13 23 43.2
14.3	17 16 54.80	17 16.67	21 51 8.4	51 33.5	8.3242	8.383		3.08	14 23 39.8
15.3	17 17 25.17	17 47.04	21 51 43.0	52 7.7	8.3239	8.378	-1.68	3.08	15 23 36.3
16.3	17 17 55.52	18 17.38	21 52 17.1	52 41.4	8.3236	8.371	1.77	3.09	16 23 32.9
17.3	17 18 25.84	18 47.69	21 52 50.7	53 14.6	8.3232	8.364	1.85	3.09	17 23 29.5
18.3	17 18 56.13	19 17.97	21 53 23.7	53 47.3	8.3227	8.357	1.91	3.09	18 23 26.1
19.3	17 19 26.39	19 48.22	21 53 56.2	54 19.5	8.3223	8.350	1.96	3.09	19 23 22.6
20.3	17 19 56.62	20 18.44	21 54 28.2	54 51.1	8.3218	8.343	2.00	3.10	20 23 19.2
21.2	17 20 26.81	20 48.61	21 54 59.7	55 22.2	8.3212	8.336	2.04	3.10	21 23 15.8
22.2	17 20 56.96	21 18.73	21 55 30.7	55 52.8	8.3206	8.329	2.08	3.10	22 23 12.3
23.2	17 21 27.06	21 48.80	21 56 1.2	56 22.9	8.3198	8.322	2.12	3.10	23 23 8.9
24.2	17 21 57.10	22 18.81	21 56 31.2	56 52.5	8.3189	8.314	2.16	3.11	24 23 5.5
25.2	17 22 27.08	22 48.76	21 57 0.6	57 21.6	8.3180	8.306	2.20	3.11	25 23 2.0
26.2	17 22 57.00	23 18.64	21 57 29.5	57 50.1	8.3171	8.299	2.24	3.11	26 22 58.6
27.2	17 23 26.85	23 48.44	21 57 57.9	58 18.1	8.3160	8.291	2.28	3.11	27 22 55.2
28.2	17 23 56.62	24 18.16	21 58 25.8	58 45.6	8.3148	8.283	2.31	3.11	28 22 51.7
29.2	17 24 26.31	24 47.79	21 58 53.2	59 12.7	8.3136	8.275	2.34	3.12	29 22 48.3
30.2	17 24 55.91	25 17.34	21 59 20.1	59 39.3	8.3123	8.267	2.37	3.12	30 22 44.9
31.2	17 25 25.42	25 46.80	21 59 46.5	60 5.3	8.3109	8.258	2.40	3.12	31 22 41.4
32.2	17 25 54.84	26 16.15	-22 0 12.3	0 30.8	+8.3095	-8.249	-2.42	+3.12	32 22 38.0



## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of a.		Log of b.		Mean Solar Time of Meridian Transit.				
	At Sidereal Oh.		At Transit.		At Sidereal Oh.		At Transit.		In R. A.	In Dec.	In R. A.	In Dec.					
Jan.	d	h	m	s	m	s							d	h	m		
0.2	7	7	49.57	7	46.27	+22	58	33.8	58	39.3	-7.8880	+8.113	0	12	23.6		
1.2	7	7	38.44	7	35.13	22	58	52.4	58	57.9	7.8887	8.113	1	12	19.5		
2.2	7	7	27.28	7	23.97	22	59	11.0	59	16.5	7.8895	8.112	2	12	15.4		
3.2	7	7	16.10	7	12.78	22	59	29.5	59	35.0	7.8903	8.110	3	12	11.3		
4.2	7	7	4.90	7	1.58	22	59	48.0	59	53.5	7.8908	8.107	4	12	7.3		
5.2	7	6	53.70	6	50.38	23	0	6.4	0	11.8	7.8910	8.105	5	12	3.3		
6.2	7	6	42.49	6	39.17	23	0	24.7	0	30.1	7.8910	8.103	6	11	59.2		
7.2	7	6	31.29	6	27.97	23	0	43.0	0	48.4	7.8907	8.101	7	11	55.1		
8.2	7	6	20.09	6	16.78	23	1	1.2	1	6.5	7.8904	8.098	8	11	51.0		
9.2	7	6	8.91	6	5.61	23	1	19.3	1	24.6	7.8898	8.095	9	11	47.0		
10.2	7	5	57.75	5	54.45	23	1	37.2	1	42.5	7.8889	8.092	10	11	42.9		
11.2	7	5	46.61	5	43.32	23	1	55.1	2	0.3	7.8878	8.089	11	11	38.8		
12.2	7	5	35.50	5	32.23	23	2	12.8	2	18.0	7.8865	8.086	12	11	34.7		
13.2	7	5	24.43	5	21.17	23	2	30.4	2	35.6	7.8850	8.083	13	11	30.6		
14.2	7	5	13.40	5	10.16	23	2	47.9	2	53.0	7.8833	8.080	14	11	26.5		
15.2	7	5	2.42	4	59.19	23	3	5.2	3	10.3	7.8814	8.076	+2.09	15	11	22.4	
16.2	7	4	51.48	4	48.27	23	3	22.4	3	27.4	7.8794	8.072	2.13	16	11	18.3	
17.2	7	4	40.60	4	37.41	23	3	39.4	3	44.3	7.8771	8.068	2.16	17	11	14.2	
18.2	7	4	29.78	4	26.61	23	3	56.2	4	1.1	7.8745	8.064	2.20	18	11	10.1	
19.2	7	4	19.03	4	15.88	23	4	12.9	4	17.8	7.8718	8.060	2.23	19	11	6.0	
20.2	7	4	8.35	4	5.22	23	4	29.4	4	34.2	7.8688	8.056	2.26	20	11	1.9	
21.2	7	3	57.74	3	54.63	23	4	45.7	4	50.5	7.8655	8.051	2.29	21	10	57.7	
22.2	7	3	47.21	3	44.13	23	5	1.8	5	6.5	7.8619	8.046	2.31	22	10	53.6	
23.2	7	3	36.78	3	33.73	23	5	17.7	5	22.3	7.8581	8.040	2.34	23	10	49.5	
24.2	7	3	26.44	3	23.42	23	5	33.4	5	37.9	7.8541	8.034	2.36	24	10	45.4	
25.2	7	3	16.20	3	13.20	23	5	48.8	5	53.3	7.8500	8.028	2.38	25	10	41.3	
26.1	7	3	6.05	3	3.09	23	6	4.1	6	8.5	7.8458	8.022	2.40	26	10	37.2	
27.1	7	2	56.01	2	53.08	23	6	19.1	6	23.5	7.8413	8.016	2.41	27	10	33.1	
28.1	7	2	46.07	2	43.17	23	6	34.0	6	38.2	7.8366	8.009	2.43	28	10	29.0	
29.1	7	2	36.24	2	33.38	23	6	48.5	6	52.7	7.8316	8.002	2.45	29	10	24.9	
30.1	7	2	26.52	2	23.70	23	7	2.9	7	7.0	7.8265	7.995	2.46	30	10	20.8	
31.1	7	2	16.92	2	14.13	23	7	17.0	7	21.1	7.8211	7.988	2.48	31	10	16.7	
Feb.	1.1	7	2	7.45	2	4.70	23	7	30.9	7	34.9	7.8154	7.980	2.49	1	10	12.6
2.1	7	1	58.10	1	55.39	23	7	44.5	7	48.4	7.8094	7.972	2.51	2	10	8.6	
3.1	7	1	48.88	1	46.21	23	7	57.8	8	1.7	7.8031	7.964	2.52	3	10	4.5	
4.1	7	1	39.80	1	37.17	23	8	10.9	8	14.7	7.7965	7.955	2.53	4	10	0.4	
5.1	7	1	30.86	1	28.27	23	8	23.8	8	27.5	7.7896	7.946	2.54	5	9	56.3	
6.1	7	1	22.06	1	19.51	23	8	36.4	8	40.0	7.7823	7.937	2.55	6	9	52.3	
7.1	7	1	13.41	1	10.91	23	8	48.7	8	52.2	7.7748	7.928	2.56	7	9	48.2	
8.1	7	1	4.91	1	2.46	23	9	0.7	9	4.2	7.7671	7.918	2.57	8	9	44.1	
9.1	7	0	56.56	0	54.16	23	9	12.5	9	15.9	7.7589	7.908	2.58	9	9	40.0	
10.1	7	0	48.38	0	46.02	23	9	24.1	9	27.3	7.7501	7.898	2.59	10	9	36.0	
11.1	7	0	40.35	0	38.04	23	9	35.3	9	38.5	7.7411	7.887	2.60	11	9	31.9	
12.1	7	0	32.50	0	30.25	23	9	46.2	9	49.3	7.7316	7.876	2.60	12	9	27.8	
13.1	7	0	24.83	0	22.62	23	9	56.9	9	59.9	7.7218	7.864	2.61	13	9	23.8	
14.1	7	0	17.32	0	15.17	23	10	7.2	10	10.2	7.7118	7.851	2.62	14	9	19.7	
15.1	7	0	10.00	0	7.89	23	10	17.3	10	20.1	7.7012	7.838	2.63	15	9	15.7	
16.1	7	0	2.85	0	0.80	23	10	27.1	10	29.8	7.6901	7.824	2.64	16	9	11.6	
17.1	6	59	55.89	59	53.89	23	10	36.5	10	39.2	7.6786	7.810	2.64	17	9	7.5	
18.1	6	59	49.11	59	47.17	23	10	45.7	10	48.3	7.6666	7.795	2.65	18	9	3.5	
19.1	6	59	42.52	59	40.64	23	10	54.5	10	57.0	7.6541	7.780	2.66	19	8	59.5	
20.1	6	59	36.13	59	34.30	23	11	3.1	11	5.5	7.6410	7.765	2.66	20	8	55.4	
21.1	6	59	29.92	59	28.15	23	11	11.3	11	13.6	7.6274	7.749	2.67	21	8	51.4	
22.1	6	59	23.91	59	22.20	23	11	19.2	11	21.4	7.6133	7.732	2.68	22	8	47.4	
23.1	6	59	18.10	59	16.45	23	11	26.8	11	29.0	7.5984	7.714	2.69	23	8	43.3	
24.1	6	59	12.49	59	10.90	23	11	34.1	11	36.2	7.5827	7.695	2.69	24	8	39.3	
25.1	6	59	7.09	59	5.55	23	11	41.1	11	43.1	7.5662	7.674	2.70	25	8	35.3	
26.1	6	59	1.88	59	0.41	23	11	47.8	11	49.7	7.5488	7.652	2.70	26	8	31.3	
27.1	6	58	56.89	58	55.48	23	11	54.1	11	55.9	7.5308	7.630	2.71	27	8	27.3	
28.1	6	58	52.11	58	50.75	23	12	0.2	12	1.9	7.5117	7.607	2.71	28	8	23.3	
29.1	6	58	47.54	58	46.24	23	12	5.9	12	7.5	7.4916	7.584	2.71	29	8	19.3	
30.1	6	58	43.18	58	41.95	+23	12	11.3	12	12.8	-7.4703	+7.560	+2.72	30	8	15.3	

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Translt.	At Sidereal Oh.	At Translt.	In R. A.	In Dec.	In R. A.	In Dec.	
Mar. d	h m s	m s	° ' "	° ' "					d h m
1.1	6 58 47.54	58 46.24	+23 12 5.9	12 7.5	-7.4916	+7.584	+2.71		1 8 19.3
2.1	6 58 43.18	58 41.95	23 12 11.3	12 12.8	7.4703	7.560	2.72		2 8 15.3
3.1	6 58 39.03	58 37.87	23 12 16.4	12 17.8	7.4478	7.535	2.72		3 8 11.3
4.0	6 58 35.10	58 34.00	23 12 21.2	12 22.5	7.4237	7.508	2.72		4 8 7.3
5.0	6 58 31.39	58 30.35	23 12 25.6	12 26.8	7.3981	7.478	2.72		5 8 3.3
6.0	6 58 27.90	58 26.92	23 12 29.7	12 30.8	7.3708	7.444	2.73		6 7 59.3
7.0	6 58 24.63	58 23.71	23 12 33.5	12 34.5	7.3414	7.405	2.73		7 7 55.3
8.0	6 58 21.58	58 20.73	23 12 37.0	12 37.9	7.3096	7.360	2.73		8 7 51.3
9.0	6 58 18.75	58 17.97	23 12 40.1	12 40.9	7.2752	7.311	2.73		9 7 47.3
10.0	6 58 16.15	58 15.44	23 12 42.9	12 43.6	7.2374	7.257	2.73		10 7 43.4
11.0	6 58 13.77	58 13.13	23 12 45.4	12 46.0	7.1957	7.199	2.74		11 7 39.4
12.0	6 58 11.63	58 11.05	23 12 47.6	12 48.1	7.1495	7.137	2.74		12 7 35.4
13.0	6 58 9.71	58 9.20	23 12 49.4	12 49.8	7.0971	7.062	2.74		13 7 31.4
14.0	6 58 8.03	58 7.58	23 12 50.9	12 51.2	7.0369	6.966	2.74		14 7 27.5
15.0	6 58 6.57	58 6.20	23 12 52.0	12 52.3	6.9678	6.844	2.74		15 7 23.5
16.0	6 58 5.35	58 5.04	23 12 52.9	12 53.0	6.8852	6.674	2.74		16 7 19.6
17.0	6 58 4.36	58 4.12	23 12 53.4	12 53.4	6.7833	+6.392	2.75		17 7 15.6
18.0	6 58 3.61	58 3.43	23 12 53.6	12 53.5	6.6499		2.75		18 7 11.7
19.0	6 58 3.08	58 2.97	23 12 53.5	12 53.3	6.4560	-6.312	2.75		19 7 7.7
20.0	6 58 2.78	58 2.74	23 12 53.0	12 52.8	-6.0946	6.631	2.75		20 7 3.8
21.0	6 58 2.72	58 2.74	23 12 52.2	12 51.9	+5.5780	6.815	2.75		21 6 59.9
22.0	6 58 2.89	58 2.98	23 12 51.1	12 50.7	6.3003	6.944	2.75		22 6 55.9
23.0	6 58 3.30	58 3.46	23 12 49.7	12 49.2	6.5567	7.046	2.75		23 6 52.0
24.0	6 58 3.93	58 4.16	23 12 47.9	12 47.3	6.7166	7.123	2.75		24 6 48.1
25.0	6 58 4.80	58 5.09	23 12 45.8	12 45.1	6.8341	7.186	2.75		25 6 44.2
26.0	6 58 5.90	58 6.26	23 12 43.4	12 42.6	6.9262	7.245	2.75		26 6 40.3
27.0	6 58 7.23	58 7.65	23 12 40.7	12 39.8	7.0021	7.299	2.74		27 6 36.4
28.0	6 58 8.79	58 9.28	23 12 37.7	12 36.7	7.0664	7.349	2.74		28 6 32.5
29.0	6 58 10.58	58 11.14	23 12 34.3	12 33.2	7.1222	7.395	2.74		29 6 28.6
30.0	6 58 12.60	58 13.23	23 12 30.6	12 29.5	7.1721	7.434	2.74		30 6 24.7
31.0	6 58 14.86	58 15.56	23 12 26.6	12 25.4	7.2156	7.468	2.74		31 6 20.8
Apr. 1.0	6 58 17.35	58 18.11	23 12 22.3	12 20.9	7.2560	7.498	2.74		1 6 16.9
2.0	6 58 20.05	58 20.89	23 12 17.6	12 16.2	7.2927	7.525	2.74		2 6 13.0
3.0	6 58 23.00	58 23.90	23 12 12.7	12 11.1	7.3268	7.551	2.73		3 6 9.1
4.0	6 58 26.17	58 27.13	23 12 7.4	12 5.7	7.3580	7.576	2.73		4 6 5.2
5.0	6 58 29.56	58 30.59	23 12 1.8	12 0.0	7.3869	7.600	2.73		5 6 1.3
6.0	6 58 33.19	58 34.28	23 11 55.8	11 54.0	7.4140	7.623	2.73		6 5 57.5
7.0	6 58 37.04	58 38.20	23 11 49.6	11 47.7	7.4394	7.645	2.73		7 5 53.6
8.0	6 58 41.11	58 42.33	23 11 43.0	11 41.0	7.4633	7.666	2.73		8 5 49.7
8.9	6 58 45.40	58 46.70	23 11 36.1	11 34.1	7.4857	7.686	2.72		9 5 45.9
9.9	6 58 49.92	58 51.28	23 11 28.9	11 26.8	7.5070	7.706	2.72		10 5 42.0
10.9	6 58 54.66	58 56.08	23 11 21.4	11 19.2	7.5273	7.725	2.72		11 5 38.2
11.9	6 58 59.62	59 1.11	23 11 13.6	11 11.2	7.5466	7.744	2.72		12 5 34.3
12.9	6 59 4.80	59 6.35	23 11 5.5	11 3.0	7.5651	7.762	2.71		13 5 30.5
13.9	6 59 10.20	59 11.82	23 10 57.0	10 54.5	7.5827	7.779	2.71		14 5 26.7
14.9	6 59 15.82	59 17.50	23 10 48.2	10 45.6	7.5994	7.795	2.71		15 5 22.8
15.9	6 59 21.65	59 23.39	23 10 39.1	10 36.4	7.6153	7.810	2.70		16 5 19.0
16.9	6 59 27.69	59 29.49	23 10 29.7	10 26.9	7.6305	7.824	2.70		17 5 15.2
17.9	6 59 33.95	59 35.81	23 10 20.0	10 17.1	7.6451	7.838	2.70		18 5 11.3
18.9	6 59 40.42	59 42.34	23 10 10.0	10 7.0	7.6592	7.851	2.69		19 5 7.5
19.9	6 59 47.09	59 49.07	23 9 59.7	9 56.6	7.6727	7.864	2.69		20 5 3.7
20.9	6 59 53.97	59 56.01	23 9 49.1	9 45.9	7.6857	7.876	2.69		21 4 59.9
21.9	7 0 1.06	0 3.16	23 9 38.1	9 34.9	7.6981	7.887	2.68		22 4 56.1
22.9	7 0 8.34	0 10.51	23 9 26.9	9 23.5	7.7101	7.899	2.68		23 4 52.2
23.9	7 0 15.83	0 18.05	23 9 15.4	9 11.9	7.7216	7.910	2.68		24 4 48.4
24.9	7 0 23.51	0 25.79	23 9 3.5	9 0.0	7.7329	7.921	2.67		25 4 44.6
25.9	7 0 31.40	0 33.73	23 8 51.4	8 47.8	7.7438	7.932	2.67		26 4 40.8
26.9	7 0 39.48	0 41.87	23 8 39.0	8 35.3	7.7542	7.943	2.67		27 4 37.0
27.9	7 0 47.75	0 50.20	23 8 26.3	8 22.5	7.7643	7.953	2.66		28 4 33.2
28.9	7 0 56.21	0 58.72	23 8 13.3	8 9.4	7.7740	7.963	2.66		29 4 29.4
29.9	7 1 4.86	1 7.43	23 8 0.0	7 56.0	7.7834	7.972	2.65		30 4 25.6
30.9	7 1 13.70	1 16.33	+23 7 46.4	7 42.3	+7.7926	-7.981	+2.65		31 4 21.8

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of <i>a</i> .		Log of <i>b</i> .		Mean Solar Time of Meridian Transit.		
	At Sidereal Oh.		At Transit.		At Sidereal Oh.		At Transit.		In R. A.	In Dec.	In R. A.	In Dec.			
May	d	h	m	s	m	s	°	'	°	'			d	h	m
	1.9	7	1	22.73	1 25.41	+23	7	32.5	7 28.4	+7.8015	-7.989	+2.64	2	4	18.1
	2.9	7	1	31.94	1 34.67	23	7	18.3	7 14.1	7.8102	7.998	2.64	3	4	14.4
	3.9	7	1	41.34	1 44.12	23	7	3.9	6 59.5	7.8186	8.007	2.63	4	4	10.6
	4.9	7	1	50.91	1 53.75	23	6	49.1	6 44.7	7.8267	8.016	2.63	5	4	6.8
	5.9	7	2	0.66	2 3.55	23	6	34.1	6 29.6	7.8346	8.024	2.62	6	4	3.0
	6.9	7	2	10.58	2 13.52	23	6	18.8	6 14.2	7.8422	8.032	2.62	7	3	59.3
	7.9	7	2	20.68	2 23.67	23	6	3.2	5 58.5	7.8495	8.040	2.61	8	3	55.5
	8.9	7	2	30.95	2 33.98	23	5	47.3	5 42.6	7.8566	8.048	2.61	9	3	51.7
	9.9	7	2	41.38	2 44.47	23	5	31.2	5 26.4	7.8635	8.055	2.60	10	3	48.0
	10.9	7	2	51.98	2 55.12	23	5	14.7	5 9.8	7.8703	8.062	2.60	11	3	44.2
	11.9	7	3	2.74	3 5.93	23	4	58.0	4 53.1	7.8769	8.069	2.59	12	3	40.5
	12.9	7	3	13.67	3 16.91	23	4	41.0	4 36.0	7.8833	8.076	2.58	13	3	36.7
	13.9	7	3	24.76	3 28.04	23	4	23.8	4 18.6	7.8895	8.083	2.57	14	3	33.0
	14.9	7	3	36.00	3 39.33	23	4	6.2	4 1.0	7.8955	8.090	2.57	15	3	29.2
	15.8	7	3	47.40	3 50.78	23	3	48.4	3 43.1	7.9013	8.097	2.56	16	3	25.5
	16.8	7	3	58.95	4 2.37	23	3	30.4	3 25.0	7.9069	8.103	2.55	17	3	21.8
	17.8	7	4	10.64	4 14.11	23	3	12.1	3 6.6	7.9124	8.109	2.54	18	3	18.0
	18.8	7	4	22.48	4 26.00	23	2	53.5	2 47.9	7.9178	8.115	2.53	19	3	14.3
	19.8	7	4	34.47	4 38.03	23	2	34.6	2 29.0	7.9229	8.121	2.52	20	3	10.6
	20.8	7	4	46.60	4 50.20	23	2	15.5	2 9.8	7.9278	8.127	2.51	21	3	6.8
	21.8	7	4	58.86	5 2.51	23	1	56.1	1 50.3	7.9326	8.133	2.50	22	3	3.1
	22.8	7	5	11.26	5 14.94	23	1	36.5	1 30.6	7.9372	8.139	2.50	23	2	59.4
	23.8	7	5	23.79	5 27.51	23	1	16.6	1 10.7	7.9417	8.145	2.49	24	2	55.7
	24.8	7	5	36.44	5 40.21	23	0	56.5	0 50.5	7.9461	8.150	2.48	25	2	51.9
	25.8	7	5	49.23	5 53.03	23	0	36.1	0 30.0	7.9504	8.155	2.47	26	2	48.2
	26.8	7	6	2.14	6 5.98	23	0	15.5	0 9.3	7.9546	8.160	2.47	27	2	44.5
	27.8	7	6	15.17	6 19.05	22	59	54.6	59 48.4	7.9586	8.165	2.46	28	2	40.8
	28.8	7	6	28.32	6 32.23	22	59	33.5	59 27.2	7.9625	8.170	2.45	29	2	37.1
	29.8	7	6	41.58	6 45.53	22	59	12.2	59 5.7	7.9663	8.175	2.44	30	2	33.4
	30.8	7	6	54.96	6 58.95	22	58	50.6	58 44.1	7.9699	8.179	2.43	31	2	29.7
	June	31.8	7	7	8.45	7 12.48	22	58	28.7	58 22.2	7.9735	8.183	2.42	32	2
1.8		7	7	22.06	7 26.12	22	58	6.7	58 0.0	7.9771	8.188	2.41	2	2	22.2
2.8		7	7	35.77	7 39.86	22	57	44.4	57 37.7	7.9805	8.192	2.40	3	2	18.5
3.8		7	7	49.59	7 53.71	22	57	21.9	57 15.1	7.9837	8.196	2.39	4	2	14.8
4.8		7	8	3.51	8 7.66	22	56	59.1	56 52.3	7.9868	8.200	2.38	5	2	11.1
5.8		7	8	17.53	8 21.71	22	56	36.2	56 29.3	7.9898	8.204	2.37	6	2	7.4
6.8		7	8	31.64	8 35.86	22	56	13.1	56 6.1	7.9927	8.208	2.36	7	2	3.7
7.8		7	8	45.85	8 50.09	22	55	49.7	55 42.6	7.9955	8.212	2.35	8	2	0.0
8.8		7	9	0.14	9 4.42	22	55	26.1	55 19.0	7.9982	8.216	2.34	9	1	56.3
9.8		7	9	14.52	9 18.83	22	55	2.3	54 55.2	8.0008	8.220	2.33	10	1	52.7
10.8		7	9	28.99	9 33.32	22	54	38.4	54 31.2	8.0032	8.223	2.31	11	1	49.0
11.8		7	9	43.54	9 47.90	22	54	14.2	54 6.9	8.0055	8.227	2.30	12	1	45.3
12.8		7	9	58.16	10 2.54	22	53	49.8	53 42.5	8.0078	8.231	2.28	13	1	41.6
13.8		7	10	12.86	10 17.27	22	53	25.3	53 17.9	8.0100	8.234	2.26	14	1	37.9
14.8		7	10	27.64	10 32.07	22	53	0.6	52 53.1	8.0122	8.237	2.24	15	1	34.2
15.8		7	10	42.48	10 46.94	22	52	35.7	52 28.2	8.0142	8.240	2.22	16	1	30.5
16.8		7	10	57.39	11 1.87	22	52	10.6	52 3.0	8.0160	8.243	2.20	17	1	26.9
17.8		7	11	12.37	11 16.86	22	51	45.3	51 37.7	8.0178	8.246	2.18	18	1	23.2
18.8		7	11	27.40	11 31.92	22	51	19.9	51 12.2	8.0196	8.249	2.15	19	1	19.5
19.8		7	11	42.50	11 47.03	22	50	54.3	50 46.5	8.0212	8.252	2.13	20	1	15.8
20.8		7	11	57.64	12 2.19	22	50	28.5	50 20.7	8.0227	8.255	2.10	21	1	12.1
21.8		7	12	12.84	12 17.41	22	50	2.5	49 54.7	8.0241	8.258	+2.07	22	1	8.5
22.8		7	12	28.09	12 32.69	22	49	36.4	49 28.5	8.0255	8.261		23	1	4.8
23.7		7	12	43.38	12 47.98	22	49	10.1	49 2.2	8.0267	8.263		24	1	1.1
24.7	7	12	58.72	13 3.34	22	48	43.7	48 35.7	8.0279	8.265		25	0	57.4	
25.7	7	13	14.10	13 18.73	22	48	17.2	48 9.1	8.0290	8.267		26	0	53.7	
26.7	7	13	29.51	13 34.16	22	47	50.5	47 42.4	8.0301	8.270		27	0	50.1	
27.7	7	13	44.96	13 49.62	22	47	23.6	47 15.5	8.0311	8.272		28	0	46.4	
28.7	7	14	0.44	14 5.12	22	46	56.7	46 48.5	8.0320	8.274		29	0	42.7	
29.7	7	14	15.95	14 20.64	22	46	29.6	46 21.4	8.0327	8.276		30	0	39.1	
30.7	7	14	31.49	14 36.19	22	46	2.4	45 54.1	8.0334	8.278		31	0	35.4	
31.7	7	14	47.06	14 51.76	+22	45	35.0	45 26.7	+8.0342	-8.280		32	0	31.7	

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of a.		Log of b.		Mean Solar Time of Meridian Transit.		
	At Sidereal Oh.		At Transit.		At Sidereal Oh.		At Transit.		In R. A.	In Dec.	In R. A.	In Dec.			
July	d	h	m	s	m	s	°	'	°	'			d	h	m
1.7	7	14	47.06	14	51.76	+22	45	35.0	45	26.7	+8.0342	-8.280	2	0	31.7
2.7	7	15	2.65	15	7.36	22	45	7.6	44	59.3	8.0347	8.282	3	0	28.0
3.7	7	15	18.26	15	22.98	22	44	40.0	44	31.7	8.0352	8.284	4	0	24.4
4.7	7	15	33.88	15	38.61	22	44	12.4	44	4.0	8.0356	8.285	5	0	20.7
5.7	7	15	49.51	15	54.25	22	43	44.6	43	36.2	8.0359	8.286	6	0	17.0
6.7	7	16	5.16	16	9.90	22	43	16.8	43	8.3	8.0361	8.288	7	0	13.3
7.7	7	16	20.81	16	25.55	22	42	48.9	42	40.4	8.0362	8.289	8	0	9.7
8.7	7	16	36.47	16	41.21	22	42	20.9	42	12.4	8.0362	8.290	9	0	6.0
9.7	7	16	52.12	16	56.87	22	41	52.8	41	44.3	8.0362	8.291	10	0	2.3
10.7	7	17	7.78	17	12.52	22	41	24.7	41	16.1	8.0361	8.293	10	23	58.6
11.7	7	17	23.42	17	28.17	22	40	56.5	40	47.9	8.0359	8.293	11	23	55.0
12.7	7	17	39.06	17	43.81	22	40	28.2	40	19.6	8.0357	8.294	12	23	51.3
13.7	7	17	54.69	17	59.43	22	39	59.9	39	51.2	8.0354	8.295	13	23	47.6
14.7	7	18	10.30	18	15.04	22	39	31.5	39	22.8	8.0349	8.296	14	23	44.0
15.7	7	18	25.89	18	30.63	22	39	3.1	38	54.4	8.0344	8.296	15	23	40.3
16.7	7	18	41.47	18	46.20	22	38	34.6	38	25.9	8.0338	8.297	16	23	36.6
17.7	7	18	57.02	19	1.75	22	38	6.1	37	57.4	8.0331	8.297	17	23	32.9
18.7	7	19	12.55	19	17.28	22	37	37.6	37	28.9	8.0323	8.297	18	23	29.3
19.7	7	19	28.04	19	32.77	22	37	9.1	37	0.4	8.0315	8.298	19	23	25.6
20.7	7	19	43.51	19	48.22	22	36	40.5	36	31.8	8.0305	8.298	20	23	21.9
21.7	7	19	58.93	20	3.64	22	36	12.0	36	3.2	8.0295	8.298	21	23	18.2
22.7	7	20	14.33	20	19.02	22	35	43.4	35	34.6	8.0283	8.298	22	23	14.6
23.7	7	20	29.68	20	34.37	22	35	14.8	35	6.0	8.0272	8.298	23	23	10.9
24.7	7	20	44.99	20	49.67	22	34	46.2	34	37.5	8.0260	8.298	24	23	7.2
25.7	7	21	0.26	21	4.92	22	34	17.6	34	8.9	8.0246	8.298	25	23	3.5
26.7	7	21	15.47	21	20.13	22	33	49.1	33	40.4	8.0231	8.297	2.10		
27.7	7	21	30.64	21	35.28	22	33	20.6	33	11.9	8.0216	8.297	2.12		
28.6	7	21	45.75	21	50.37	22	32	52.1	32	43.4	8.0201	8.296	2.14		
29.6	7	22	0.80	22	5.41	22	32	23.7	32	15.0	8.0185	8.296	2.16		
30.6	7	22	15.80	22	20.39	22	31	55.3	31	46.6	8.0168	8.295	2.18		
31.6	7	22	30.74	22	35.31	22	31	27.0	31	18.3	8.0149	8.294	2.20		
Aug. 1.6	7	22	45.61	22	50.17	22	30	58.7	30	50.0	8.0130	8.293	2.21		
2.6	7	23	0.41	23	4.95	22	30	30.5	30	21.8	8.0109	8.292	3.23		
3.6	7	23	15.14	23	19.66	22	30	2.3	29	53.7	8.0088	8.291	2.25		
4.6	7	23	29.80	23	34.30	22	29	34.3	29	25.7	8.0066	8.289	2.26		
5.6	7	23	44.38	23	48.86	22	29	6.3	28	57.7	8.0042	8.288	2.28		
6.6	7	23	58.88	24	3.33	22	28	38.4	28	29.9	8.0018	8.286	2.29		
7.6	7	24	13.30	24	17.73	22	28	10.7	28	2.1	7.9993	8.285	2.31		
8.6	7	24	27.64	24	32.04	22	27	43.0	27	34.5	7.9966	8.283	2.32		
9.6	7	24	41.88	24	46.26	22	27	15.5	27	7.1	7.9939	8.281	2.34		
10.6	7	24	56.03	25	0.38	22	26	48.1	26	39.7	7.9910	8.279	2.35		
11.6	7	25	10.09	25	14.42	22	26	20.9	26	12.5	7.9880	8.277	2.37		
12.6	7	25	24.05	25	28.35	22	25	53.7	25	45.4	7.9849	8.275	2.38		
13.6	7	25	37.91	25	42.18	22	25	26.7	25	18.4	7.9817	8.273	2.40		
14.6	7	25	51.66	25	55.90	22	24	59.9	24	51.6	7.9785	8.270	2.41		
15.6	7	26	5.31	26	9.52	22	24	33.2	24	25.0	7.9751	8.267	2.42		
16.6	7	26	18.86	26	23.03	22	24	6.7	23	58.6	7.9716	8.264	2.43		
17.6	7	26	32.29	26	36.43	22	23	40.4	23	32.3	7.9679	8.261	2.44		
18.6	7	26	45.61	26	49.71	22	23	14.3	23	6.2	7.9642	8.258	2.45		
19.6	7	26	58.81	27	2.88	22	22	48.3	22	40.3	7.9604	8.255	2.46		
20.6	7	27	11.90	27	15.94	22	22	22.5	22	14.6	7.9565	8.252	2.46		
21.6	7	27	24.87	27	28.87	22	21	56.9	21	49.0	7.9524	8.249	2.47		
22.6	7	27	37.71	27	41.68	22	21	31.6	21	23.7	7.9482	8.245	2.48		
23.6	7	27	50.43	27	54.36	22	21	6.4	20	58.6	7.9439	8.241	2.48		
24.6	7	28	3.02	28	6.91	22	20	41.4	20	33.8	7.9394	8.237	2.49		
25.6	7	28	15.48	28	19.33	22	20	16.7	20	9.1	7.9349	8.232	2.50		
26.6	7	28	27.81	28	31.62	22	19	52.3	19	44.7	7.9302	8.227	2.51		
27.6	7	28	40.00	28	43.77	22	19	28.0	19	20.5	7.9253	8.222	2.52		
28.6	7	28	52.06	28	55.78	22	19	4.0	18	56.6	7.9202	8.218	2.52		
29.6	7	29	3.97	29	7.65	22	18	40.3	18	33.0	7.9149	8.214	2.53		
30.6	7	29	15.73	29	19.37	22	18	16.7	18	9.6	7.9095	8.209	2.54		
31.6	7	29	27.35	29	30.94	+22	17	53.7	17	46.5	+7.9040	-8.204	-2.55		



## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
Nov. 1.4	d h m s	m s	+22° 7' 1.0"	7' 2.5"	-6.8970	+7.500	-2.74		d h m
2.4	7 35 17.25	35 16.88	22 7 1.0	7 2.5	6.9770	7.545	2.74		1 16 48.4
3.4	7 35 16.00	35 15.56	22 7 5.8	7 7.5	7.0441	7.586	2.74		2 16 44.5
4.4	7 35 14.52	35 14.01	22 7 11.1	7 12.9	7.1022	7.624	2.74		3 16 40.5
5.4	7 35 12.82	35 12.23	22 7 16.9	7 18.9	7.1533	7.659	2.74		4 16 36.6
6.4	7 35 10.88	35 10.22	22 7 23.2	7 25.3	7.1986	7.692	2.73		5 16 32.6
7.4	7 35 8.72	35 7.99	22 7 30.0	7 32.3	7.2398	7.723	2.73		6 16 28.6
8.4	7 35 6.33	35 5.53	22 7 37.3	7 39.8	7.2776	7.751	2.73		7 16 24.6
9.4	7 35 3.71	35 2.84	22 7 45.2	7 47.8	7.3117	7.777	2.73		8 16 20.7
10.4	7 35 0.87	34 50.93	22 7 53.5	7 56.3	7.3430	7.801	2.73		9 16 16.7
11.4	7 34 57.81	34 56.80	22 8 2.4	8 5.3	7.3722	7.823	2.72		10 16 12.7
12.4	7 34 54.53	34 53.45	22 8 11.7	8 14.8	7.3993	7.843	2.72		11 16 8.7
13.4	7 34 51.03	34 49.88	22 8 21.5	8 24.7	7.4248	7.862	2.72		12 16 4.7
14.4	7 34 47.31	34 46.09	22 8 31.7	8 35.1	7.4485	7.880	2.72		13 16 0.7
15.3	7 34 43.37	34 42.08	22 8 42.4	8 46.0	7.4709	7.898	2.71		14 15 56.7
16.3	7 34 39.22	34 37.86	22 8 53.6	8 57.3	7.4920	7.916	2.71		15 15 52.7
17.3	7 34 34.85	34 33.43	22 9 5.3	9 9.1	7.5120	7.933	2.71		16 15 48.7
18.3	7 34 30.27	34 28.78	22 9 17.4	9 21.3	7.5308	7.949	2.70		17 15 44.7
19.3	7 34 25.49	34 23.93	22 9 29.9	9 34.0	7.5486	7.964	2.70		18 15 40.7
20.3	7 34 20.50	34 18.88	22 9 43.0	9 47.2	7.5657	7.979	2.70		19 15 36.7
21.3	7 34 15.30	34 13.62	22 9 56.4	10 0.8	7.5820	7.993	2.69		20 15 32.7
22.3	7 34 9.90	34 8.15	22 10 10.3	10 14.8	7.5975	8.006	2.69		21 15 28.7
23.3	7 34 4.30	34 2.49	22 10 24.6	10 29.2	7.6122	8.018	2.69		22 15 24.6
24.3	7 33 58.50	33 56.63	22 10 39.3	10 44.0	7.6262	8.029	2.68		23 15 20.6
25.3	7 33 52.51	33 50.58	22 10 54.4	10 59.3	7.6397	8.040	2.68		24 15 16.6
26.3	7 33 46.32	33 44.33	22 11 9.9	11 14.9	7.6528	8.050	2.67		25 15 12.5
27.3	7 33 39.94	33 37.89	22 11 25.8	11 30.9	7.6655	8.059	2.66		26 15 8.5
28.3	7 33 33.37	33 31.26	22 11 42.1	11 47.3	7.6775	8.069	2.65		27 15 4.5
29.3	7 33 26.61	33 24.44	22 11 58.8	12 4.1	7.6890	8.078	2.64		28 15 0.4
30.3	7 33 19.66	33 17.44	22 12 15.9	12 21.3	7.7001	8.087	2.64		29 14 56.4
Dec. 1.3	7 33 12.54	33 10.26	22 12 33.3	12 38.9	7.7106	8.096	2.63		30 14 52.3
2.3	7 33 5.23	33 2.90	22 12 51.1	12 56.8	7.7206	8.105	2.62		1 14 48.3
3.3	7 32 57.75	32 55.36	22 13 9.2	13 15.0	7.7302	8.113	2.61		2 14 44.2
4.3	7 32 50.09	32 47.65	22 13 27.7	13 33.6	7.7395	8.120	2.60		3 14 40.2
5.3	7 32 42.27	32 39.78	22 13 46.5	13 52.5	7.7484	8.127	2.59		4 14 36.1
6.3	7 32 34.29	32 31.74	22 14 5.6	14 11.7	7.7569	8.134	2.58		5 14 32.0
7.3	7 32 26.14	32 23.55	22 14 25.0	14 31.2	7.7649	8.140	2.57		6 14 28.0
8.3	7 32 17.83	32 15.19	22 14 44.7	14 51.0	7.7726	8.146	2.56		7 14 23.9
9.3	7 32 9.38	32 6.69	22 15 4.7	15 11.0	7.7800	8.152	2.55		8 14 19.8
10.3	7 32 0.77	31 58.04	22 15 24.9	15 31.4	7.7872	8.158	2.54		9 14 15.7
11.3	7 31 52.02	31 49.24	22 15 45.5	15 52.0	7.7942	8.163	2.53		10 14 11.6
12.3	7 31 43.13	31 40.30	22 16 6.3	16 12.9	7.8008	8.168	2.52		11 14 7.5
13.3	7 31 34.09	31 31.23	22 16 27.4	16 34.1	7.8070	8.173	2.51		12 14 3.5
14.3	7 31 24.92	31 22.02	22 16 48.6	16 55.3	7.8131	8.177	2.50		13 13 59.4
15.3	7 31 15.62	31 12.68	22 17 10.1	17 16.9	7.8189	8.181	2.48		14 13 55.3
16.3	7 31 6.19	31 3.21	22 17 31.8	17 38.6	7.8243	8.185	2.47		15 13 51.2
17.3	7 30 56.64	30 53.62	22 17 53.7	18 0.6	7.8295	8.189	2.45		16 13 47.1
18.3	7 30 46.97	30 43.92	22 18 15.9	18 22.8	7.8346	8.192	2.43		17 13 43.0
19.3	7 30 37.19	30 34.11	22 18 38.2	18 45.2	7.8394	8.195	2.41		18 13 38.9
20.3	7 30 27.30	30 24.18	22 19 0.7	19 7.8	7.8439	8.198	2.39		19 13 34.8
21.2	7 30 17.30	30 14.15	22 19 23.3	19 30.5	7.8481	8.201	2.37		20 13 30.7
22.2	7 30 7.19	30 4.02	22 19 46.1	19 53.3	7.8521	8.204	2.35		21 13 26.6
23.2	7 29 57.00	29 53.79	22 20 9.1	20 16.3	7.8560	8.206	2.33		22 13 22.5
24.2	7 29 46.71	29 43.47	22 20 32.1	20 39.4	7.8598	8.208	2.31		23 13 18.4
25.2	7 29 36.33	29 33.07	22 20 55.3	21 2.6	7.8628	8.210	2.29		24 13 14.3
26.2	7 29 25.86	29 22.59	22 21 18.6	21 25.9	7.8661	8.212	2.27		25 13 10.2
27.2	7 29 15.32	29 12.03	22 21 42.0	21 49.3	7.8690	8.213	2.24		26 13 6.1
28.2	7 29 4.70	29 1.39	22 22 5.4	22 12.8	7.8716	8.214	2.21		27 13 2.0
29.2	7 28 54.02	28 50.69	22 22 29.0	22 36.3	7.8741	8.215	2.18		28 12 57.9
30.2	7 28 43.28	28 39.92	22 22 52.6	22 59.9	7.8765	8.216	2.15		29 12 53.8
31.2	7 28 32.47	28 29.10	22 23 16.2	23 23.6	7.8787	8.217	2.12		30 12 49.7
32.2	7 28 21.60	28 18.22	22 23 39.9	23 47.3	-7.8806	+8.217	-2.08		31 12 45.6
	7 28 10.69	28 7.29	+22 24 3.6	24 11.0					32 12 41.5

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of <i>a</i> .		Log of <i>b</i> .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Oh.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
Jan. d	h m s	m s	° ' "	° ' "					d h m
0.2	0 56 6.59	56 6.61	+4 13 52.6	13 52.9	+6.7196	+7.745	+2.48	+3.29	0 6 13.5
1.2	0 56 7.40	56 7.42	4 14 1.1	14 1.4	6.7874	7.787	2.48	3.29	1 6 9.6
2.2	0 56 8.32	56 8.35	4 14 10.4	14 10.8	6.8351	7.828	2.48	3.29	2 6 5.6
3.2	0 56 9.37	56 9.40	4 14 20.5	14 20.9	6.8909	7.864	2.48	3.29	3 6 1.7
4.2	0 56 10.56	56 10.60	4 14 31.4	14 31.8	6.9394	7.896	2.48	3.29	4 5 57.8
5.2	0 56 11.87	56 11.92	4 14 43.1	14 43.6	6.9831	7.925	2.48	3.29	5 5 53.9
6.2	0 56 13.32	56 13.39	4 14 55.6	14 56.1	7.0221	7.953	2.48	3.29	6 5 50.0
7.2	0 56 14.90	56 14.96	4 15 8.9	15 9.4	7.0578	7.979	2.48	3.29	7 5 46.1
8.2	0 56 16.60	56 16.66	4 15 23.0	15 23.6	7.0902	8.003	2.47	3.28	8 5 42.2
9.2	0 56 18.44	56 18.51	4 15 37.9	15 38.5	7.1204	8.026	2.47	3.28	9 5 38.3
10.2	0 56 20.40	56 20.47	4 15 53.6	15 54.3	7.1481	8.048	2.47	3.28	10 5 34.4
11.2	0 56 22.49	56 22.57	4 16 10.0	16 10.7	7.1741	8.068	2.47	3.28	11 5 30.5
12.2	0 56 24.70	56 24.78	4 16 27.2	16 27.9	7.1986	8.087	2.47	3.27	12 5 26.6
13.2	0 56 27.05	56 27.14	4 16 45.2	16 46.0	7.2219	8.105	2.47	3.27	13 5 22.7
14.2	0 56 29.52	56 29.61	4 17 4.0	17 4.8	7.2439	8.123	2.47	3.27	14 5 18.8
15.2	0 56 32.11	56 32.21	4 17 23.5	17 24.3	7.2649	8.140	2.47	3.26	15 5 14.9
16.2	0 56 34.82	56 34.92	4 17 43.8	17 44.7	7.2844	8.156	2.46	3.26	16 5 11.0
17.2	0 56 37.66	56 37.77	4 18 4.8	18 5.7	7.3033	8.172	2.46	3.26	17 5 7.2
18.2	0 56 40.62	56 40.73	4 18 26.6	18 27.5	7.3212	8.187	2.46	3.25	18 5 3.3
19.2	0 56 43.70	56 43.82	4 18 49.1	18 50.0	7.3386	8.201	2.46	3.25	19 4 59.4
20.2	0 56 46.90	56 47.02	4 19 12.4	19 13.4	7.3551	8.215	2.45	3.24	20 4 55.5
21.2	0 56 50.23	56 50.36	4 19 36.4	19 37.4	7.3709	8.229	2.45	3.24	21 4 51.7
22.2	0 56 53.68	56 53.81	4 20 1.1	20 2.1	7.3857	8.242	2.45	3.24	22 4 47.8
23.2	0 56 57.24	56 57.38	4 20 26.5	20 27.5	7.4001	8.254	2.45	3.23	23 4 43.9
24.2	0 57 0.92	57 1.06	4 20 52.6	20 53.7	7.4140	8.266	2.44	3.23	24 4 40.0
25.2	0 57 4.71	57 4.86	4 21 19.5	21 20.6	7.4271	8.277	2.44	3.22	25 4 36.2
26.1	0 57 8.61	57 8.76	4 21 47.1	21 48.2	7.4400	8.288	2.44	3.22	26 4 32.3
27.1	0 57 12.63	57 12.79	4 22 15.4	22 16.5	7.4523	8.298	2.44	3.22	27 4 28.4
28.1	0 57 16.77	57 16.93	4 22 44.3	22 45.5	7.4641	8.308	2.43	3.21	28 4 24.5
29.1	0 57 21.02	57 21.19	4 23 13.8	23 15.0	7.4756	8.318	2.43	3.21	29 4 20.7
30.1	0 57 25.39	57 25.56	4 23 44.0	23 45.2	7.4868	8.327	2.43	3.21	30 4 16.8
31.1	0 57 29.87	57 30.05	4 24 14.9	24 16.1	7.4975	8.336	2.42	3.20	31 4 13.0
Feb. 1.1	0 57 34.45	57 34.63	4 24 46.5	24 47.8	7.5080	8.345	2.42	3.20	1 4 9.1
2.1	0 57 39.14	57 39.33	4 25 18.7	25 20.0	7.5180	8.354	2.41	3.19	2 4 5.3
3.1	0 57 43.94	57 44.13	4 25 51.6	25 52.9	7.5276	8.362	2.41	3.19	3 4 1.4
4.1	0 57 48.85	57 49.05	4 26 25.1	26 26.4	7.5372	8.370	2.40	3.18	4 3 57.6
5.1	0 57 53.86	57 54.06	4 26 59.2	27 0.6	7.5463	8.378	2.40	3.18	5 3 53.7
6.1	0 57 58.97	57 59.18	4 27 33.8	27 35.2	7.5550	8.386	2.39	3.17	6 3 49.9
7.1	0 58 4.19	58 4.40	4 28 9.1	28 10.5	7.5632	8.393	2.39	3.17	7 3 46.0
8.1	0 58 9.51	58 9.72	4 28 45.0	28 46.4	7.5714	8.400	2.38	3.16	8 3 42.2
9.1	0 58 14.93	58 15.15	4 29 21.5	29 23.0	7.5795	8.407	2.38	3.15	9 3 38.3
10.1	0 58 20.44	58 20.66	4 29 58.5	30 0.0	7.5872	8.414	2.37	3.14	10 3 34.5
11.1	0 58 26.05	58 26.28	4 30 36.1	30 37.6	7.5945	8.420	2.37	3.14	11 3 30.6
12.1	0 58 31.76	58 31.99	4 31 14.2	31 15.7	7.6017	8.426	2.36	3.13	12 3 26.8
13.1	0 58 37.56	58 37.79	4 31 52.9	31 54.5	7.6087	8.432	2.36	3.12	13 3 23.0
14.1	0 58 43.45	58 43.69	4 32 32.2	32 33.8	7.6154	8.438	2.35	3.11	14 3 19.2
15.1	0 58 49.44	58 49.68	4 33 12.0	33 13.6	7.6221	8.444	2.35	3.10	15 3 15.3
16.1	0 58 55.52	58 55.76	4 33 52.3	33 53.9	7.6286	8.449	2.34	3.09	16 3 11.5
17.1	0 59 1.68	59 1.93	4 34 33.0	34 34.7	7.6350	8.454	2.33	3.08	17 3 7.6
18.1	0 59 7.93	59 8.18	4 35 14.2	35 15.9	7.6408	8.459	2.32	3.07	18 3 3.8
19.1	0 59 14.27	59 14.53	4 35 55.9	35 57.6	7.6466	8.464	2.31	3.06	19 2 59.9
20.1	0 59 20.69	59 20.95	4 36 38.1	36 39.8	7.6522	8.469	2.30	3.05	20 2 56.1
21.1	0 59 27.19	59 27.45	4 37 20.8	37 22.6	7.6575	8.474	2.29	3.04	21 2 52.3
22.1	0 59 33.78	59 34.05	4 38 4.0	38 5.8	7.6627	8.479	2.28	3.02	22 2 48.5
23.1	0 59 40.45	59 40.72	4 38 47.6	38 49.4	7.6679	8.483	2.27	3.01	23 2 44.7
24.1	0 59 47.19	59 47.46	4 39 31.6	39 33.4	7.6728	8.487	2.26	3.00	24 2 40.9
25.1	0 59 54.00	59 54.28	4 40 16.0	40 17.9	7.6776	8.491	2.25	2.99	25 2 37.1
26.1	1 0 0.89	0 1.17	4 41 0.9	41 2.8	7.6821	8.495	2.24	2.97	26 2 33.3
27.1	1 0 7.86	0 8.14	4 41 46.2	41 48.1	7.6866	8.499	2.23	2.96	27 2 29.4
28.1	1 0 14.89	0 15.18	4 42 31.8	42 33.7	7.6909	8.503	2.22	2.95	28 2 25.6
29.1	1 0 21.99	0 22.28	4 43 17.8	43 19.8	7.6952	8.506	2.21	2.94	29 2 21.8
30.1	1 0 29.16	0 29.46	+4 44 4.1	44 6.1	+7.6993	+8.509	+2.20	+2.92	30 2 18.0

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Ch.		At Transit.		At Sidereal Ch.		At Transit.		In R.A.	In Dec.	In R.A.	In Dec.	
Mar. d	h	m	s	m	°	'	"	"					d h m
1.1	1	0	21.99	0 22.28	+4	43	17.8	43 19.8	+7.6952	+8.506	+2.21	+2.94	1 2 21.8
2.1	1	0	20.16	0 20.46	4	44	4.1	44 6.1	7.6993	8.509	2.20	2.92	2 2 18.0
3.0	1	0	36.40	0 36.70	4	44	50.8	44 52.8	7.7033	8.512	2.19	2.91	3 2 14.2
4.0	1	0	43.70	0 44.00	4	45	37.8	45 39.8	7.7072	8.515	2.18	2.90	4 2 10.4
5.0	1	0	51.06	0 51.37	4	46	25.1	46 27.1	7.7109	8.518	2.17	2.89	5 2 6.6
6.0	1	0	58.49	0 58.80	4	47	12.8	47 14.8	7.7142	8.521	2.15	2.87	6 2 2.8
7.0	1	1	5.98	1 6.29	4	48	0.7	48 2.7	7.7174	8.524	2.14	2.86	7 1 58.9
8.0	1	1	13.52	1 13.84	4	48	48.9	48 51.0	7.7206	8.527	2.12	2.85	8 1 55.1
9.0	1	1	21.11	1 21.43	4	49	37.4	49 39.5	7.7236	8.530	2.11	2.84	9 1 51.3
10.0	1	1	28.76	1 29.09	4	50	26.3	50 28.4	7.7266	8.532	2.09	2.82	10 1 47.5
11.0	1	1	36.46	1 36.79	4	51	15.4	51 17.5	7.7295	8.534	2.08	2.81	11 1 43.7
12.0	1	1	44.21	1 44.54	4	52	4.7	52 6.8	7.7321	8.536	2.06	2.80	12 1 39.9
13.0	1	1	52.01	1 52.35	4	52	54.3	52 56.4	7.7348	8.538	2.05	2.79	13 1 35.1
14.0	1	1	59.85	2 0.19	4	53	44.1	53 46.2	7.7374	8.540	2.03	2.77	14 1 32.3
15.0	1	2	7.74	2 8.08	4	54	34.2	54 36.4	7.7397	8.542	2.01	2.76	15 1 28.5
16.0	1	2	15.67	2 16.01	4	55	24.5	55 26.7	7.7421	8.544	1.99	2.74	16 1 24.7
17.0	1	2	23.64	2 23.98	4	56	15.0	56 17.2	7.7445	8.546	1.97	2.72	17 1 20.9
18.0	1	2	31.66	2 32.01	4	57	5.7	57 7.9	7.7466	8.548	1.95	2.70	18 1 17.1
19.0	1	2	39.72	2 40.07	4	57	56.5	57 58.7	7.7487	8.549	1.93	+2.67	19 1 13.3
20.0	1	2	47.81	2 48.16	4	58	47.4	58 49.6	7.7505	8.550	1.91		20 1 9.5
21.0	1	2	55.93	2 56.28	4	59	38.4	59 40.6	7.7522	8.551	1.89		21 1 5.7
22.0	1	3	4.08	3 4.43	5	0	29.5	0 31.7	7.7536	8.552	1.87		22 1 2.0
23.0	1	3	12.26	3 12.61	5	1	20.8	1 23.0	7.7550	8.553	1.84		23 0 58.2
24.0	1	3	20.47	3 20.83	5	2	12.3	2 14.5	7.7564	8.554	1.81		24 0 54.4
25.0	1	3	28.70	3 29.06	5	3	3.9	3 6.1	7.7577	8.554	1.78		25 0 50.6
26.0	1	3	36.96	3 37.32	5	3	55.5	3 57.8	7.7589	8.555	1.75		26 0 46.8
27.0	1	3	45.24	3 45.60	5	4	47.2	4 49.5	7.7600	8.555	1.71		27 0 43.0
28.0	1	3	53.54	3 53.90	5	5	38.9	5 41.2	7.7611	8.555	+1.66		28 0 39.2
29.0	1	4	1.86	4 2.22	5	6	30.7	6 33.0	7.7620	8.556			29 0 35.4
30.0	1	4	10.19	4 10.55	5	7	22.5	7 24.8	7.7629	8.556			30 0 31.6
31.0	1	4	18.54	4 18.90	5	8	14.3	8 16.6	7.7638	8.556			31 0 27.8
Apr. 1.0	1	4	26.91	4 27.28	5	9	6.2	9 8.5	7.7645	8.556			1 0 24.0
2.0	1	4	35.29	4 35.66	5	9	58.1	10 0.4	7.7650	8.556			2 0 20.2
3.0	1	4	43.68	4 44.05	5	10	49.9	10 52.2	7.7655	8.556			3 0 16.4
4.0	1	4	52.07	4 52.44	5	11	41.7	11 44.0	7.7660	8.556			4 0 12.6
5.0	1	5	0.47	5 0.84	5	12	33.5	12 35.8	7.7662	8.556			5 0 8.8
6.0	1	5	8.88	5 9.25	5	13	25.3	13 27.6	7.7663	8.555			6 0 5.0
7.0	1	5	17.29	5 17.66	5	14	17.0	14 19.3	7.7664	8.555			7 0 1.3
8.0	1	5	25.70	5 26.07	5	15	8.6	15 10.9	7.7664	8.554			7 23 57.5
8.9	1	5	34.11	5 34.49	5	16	0.1	16 2.4	7.7663	8.554			8 23 53.7
9.9	1	5	42.52	5 42.90	5	16	51.6	16 53.9	7.7661	8.553			9 23 49.9
10.9	1	5	50.92	5 51.30	5	17	43.0	17 45.3	7.7658	8.552			10 23 46.1
11.9	1	5	59.31	5 59.69	5	18	34.2	18 36.5	7.7654	8.551			11 23 42.3
12.9	1	6	7.70	6 8.08	5	19	25.3	19 27.6	7.7649	8.550			12 23 38.5
13.9	1	6	16.08	6 16.46	5	20	16.3	20 18.6	7.7643	8.549			13 23 34.7
14.9	1	6	24.44	6 24.82	5	21	7.2	21 9.5	7.7636	8.548			14 23 30.9
15.9	1	6	32.78	6 33.17	5	21	57.9	22 0.2	7.7628	8.546			15 23 27.1
16.9	1	6	41.11	6 41.50	5	22	48.4	22 50.7	7.7619	8.545			16 23 23.3
17.9	1	6	49.42	6 49.81	5	23	38.8	23 41.1	7.7609	8.544	-1.66	-2.65	17 23 19.5
18.9	1	6	57.71	6 58.10	5	24	29.0	24 31.3	7.7598	8.542	1.70	2.69	18 23 15.7
19.9	1	7	5.99	7 6.38	5	25	19.0	25 21.3	7.7586	8.540	1.74	2.72	19 23 11.9
20.9	1	7	14.24	7 14.63	5	26	8.8	26 11.1	7.7573	8.538	1.77	2.74	20 23 8.1
21.9	1	7	22.46	7 22.85	5	26	58.4	27 0.7	7.7559	8.536	1.80	2.76	21 23 4.3
22.9	1	7	30.65	7 31.04	5	27	47.7	27 50.0	7.7544	8.532	1.83	2.78	22 23 0.5
23.9	1	7	38.82	7 39.21	5	28	36.8	28 39.1	7.7527	8.530	1.85	2.79	23 22 56.8
24.9	1	7	46.95	7 47.33	5	29	25.6	29 27.9	7.7510	8.528	1.88	2.81	24 22 53.0
25.9	1	7	55.05	7 55.43	5	30	14.2	30 16.5	7.7492	8.525	1.90	2.82	25 22 49.2
26.9	1	8	3.12	8 3.50	5	31	2.5	31 4.8	7.7474	8.522	1.93	2.84	26 22 45.4
27.9	1	8	11.16	8 11.54	5	31	50.5	31 52.8	7.7455	8.519	1.95	2.85	27 22 41.6
28.9	1	8	19.16	8 19.54	5	32	38.2	32 40.5	7.7435	8.516	1.97	2.87	28 22 37.8
29.9	1	8	27.12	8 27.50	5	33	25.6	33 27.9	7.7414	8.513	1.99	2.88	29 22 34.0
30.9	1	8	35.04	8 35.42	+5	34	12.7	34 15.0	+7.7392	+8.510	-2.01	-2.89	30 22 30.2



## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of a.		Log of b.		Mean Solar Time of Meridian Transit.				
	At Sidereal Oh.		At Transit.		At Sidereal Oh.		At Transit.		In R.A.	In Dec.	In R.A.	In Dec.					
	d	m	s	m	s	s	s	s									
May 1.9	1	8	42.92	8	43.30	+5	34	59.5	35	17	+7.7369	+8.507	-2.03	-2.90	1	22	26.4
2.9	1	8	50.76	8	51.13	5	35	46.0	35	48.2	7.7344	8.504	2.05	2.91	2	22	22.6
3.9	1	8	58.55	8	58.92	5	36	32.1	36	34.3	7.7318	8.501	2.06	2.92	3	22	18.8
4.9	1	9	6.29	9	6.66	5	37	17.9	37	20.1	7.7291	8.498	2.08	2.93	4	22	15.0
5.9	1	9	13.98	9	14.35	5	38	3.3	38	5.5	7.7263	8.494	2.09	2.94	5	22	11.2
6.9	1	9	21.62	9	21.99	5	38	48.3	38	50.5	7.7234	8.490	2.11	2.95	6	22	7.4
7.9	1	9	29.21	9	29.58	5	39	32.9	39	35.1	7.7204	8.486	2.12	2.96	7	22	3.6
8.9	1	9	36.75	9	37.11	5	40	17.2	40	19.4	7.7173	8.482	2.13	2.97	8	21	59.8
9.9	1	9	44.23	9	44.59	5	41	1.1	41	3.3	7.7141	8.478	2.14	2.98	9	21	55.9
10.9	1	9	51.66	9	52.02	5	41	44.6	41	46.8	7.7107	8.474	2.16	2.99	10	21	52.1
11.9	1	9	59.02	9	59.38	5	42	27.6	42	29.7	7.7072	8.470	2.17	3.00	11	21	48.3
12.9	1	10	6.32	10	6.68	5	43	10.2	43	12.3	7.7036	8.465	2.18	3.01	12	21	44.5
13.9	1	10	13.57	10	13.92	5	43	52.4	43	54.5	7.6998	8.460	2.19	3.02	13	21	40.7
14.9	1	10	20.75	10	21.10	5	44	34.1	44	36.2	7.6959	8.455	2.20	3.03	14	21	36.9
15.9	1	10	27.86	10	28.21	5	45	15.4	45	17.5	7.6919	8.450	2.21	3.04	15	21	33.1
16.8	1	10	34.91	10	35.25	5	45	56.2	45	58.2	7.6878	8.445	2.22	3.05	16	21	29.3
17.8	1	10	41.89	10	42.23	5	46	36.5	46	38.5	7.6835	8.440	2.23	3.06	17	21	25.4
18.8	1	10	48.80	10	49.14	5	47	16.4	47	18.4	7.6790	8.434	2.24	3.07	18	21	21.6
19.8	1	10	55.64	10	55.98	5	47	55.8	47	57.8	7.6744	8.428	2.25	3.08	19	21	17.8
20.8	1	11	2.41	11	2.75	5	48	34.7	48	36.6	7.6697	8.422	2.26	3.09	20	21	14.0
21.8	1	11	9.10	11	9.43	5	49	13.0	49	14.9	7.6648	8.416	2.26	3.09	21	21	10.2
22.8	1	11	15.72	11	16.05	5	49	50.9	49	52.8	7.6598	8.410	2.27	3.10	22	21	6.4
23.8	1	11	22.26	11	22.59	5	50	28.3	50	30.2	7.6547	8.404	2.28	3.11	23	21	2.6
24.8	1	11	28.72	11	29.04	5	51	5.1	51	7.0	7.6495	8.398	2.29	3.12	24	20	58.8
25.8	1	11	35.11	11	35.43	5	51	41.4	51	43.2	7.6442	8.391	2.29	3.12	25	20	54.9
26.8	1	11	41.43	11	41.75	5	52	17.1	52	18.9	7.6387	8.384	2.30	3.13	26	20	51.1
27.8	1	11	47.66	11	47.97	5	52	52.3	52	54.1	7.6330	8.377	2.31	3.13	27	20	47.2
28.8	1	11	53.80	11	54.11	5	53	26.9	53	28.6	7.6272	8.370	2.32	3.14	28	20	43.4
29.8	1	11	59.85	12	0.15	5	54	1.0	54	2.7	7.6212	8.363	2.32	3.14	29	20	39.5
30.8	1	12	5.83	12	6.13	5	54	34.5	54	36.2	7.6149	8.356	2.33	3.15	30	20	35.7
31.8	1	12	11.72	12	12.02	5	55	7.5	55	9.2	7.6083	8.348	2.33	3.15	31	20	31.9
June 1.8	1	12	17.52	12	17.81	5	55	39.9	55	41.6	7.6015	8.340	2.34	3.16	1	20	28.1
2.8	1	12	23.22	12	23.51	5	56	11.6	56	13.2	7.5945	8.332	2.34	3.16	2	20	24.2
3.8	1	12	28.82	12	29.10	5	56	42.8	56	44.4	7.5873	8.323	2.35	3.17	3	20	20.4
4.8	1	12	34.34	12	34.62	5	57	13.4	57	15.0	7.5800	8.314	2.35	3.17	4	20	16.6
5.8	1	12	39.77	12	40.05	5	57	43.4	57	44.9	7.5725	8.305	2.36	3.18	5	20	12.8
6.8	1	12	45.12	12	45.39	5	58	12.7	58	14.2	7.5649	8.295	2.36	3.18	6	20	8.9
7.8	1	12	50.36	12	50.63	5	58	41.4	58	42.9	7.5569	8.285	2.37	3.18	7	20	5.1
8.8	1	12	55.50	12	55.76	5	59	9.5	59	11.0	7.5487	8.275	2.37	3.19	8	20	1.2
9.8	1	13	0.54	13	0.80	5	59	37.0	59	38.4	7.5405	8.265	2.38	3.19	9	19	57.4
10.8	1	13	5.49	13	5.74	6	0	3.9	0	5.3	7.5317	8.254	2.38	3.19	10	19	53.5
11.8	1	13	10.34	13	10.59	6	0	30.1	0	31.5	7.5224	8.243	2.39	3.19	11	19	49.7
12.8	1	13	15.08	13	15.32	6	0	55.6	0	56.9	7.5130	8.231	2.39	3.20	12	19	45.8
13.8	1	13	19.72	13	19.96	6	1	20.5	1	21.8	7.5035	8.219	2.40	3.20	13	19	42.0
14.8	1	13	24.26	13	24.49	6	1	44.7	1	46.0	7.4937	8.206	2.40	3.20	14	19	38.1
15.8	1	13	28.69	13	28.92	6	2	8.2	2	9.4	7.4833	8.193	2.41	3.20	15	19	34.3
16.8	1	13	33.02	13	33.24	6	2	31.1	2	32.3	7.4726	8.180	2.41	3.20	16	19	30.4
17.8	1	13	37.24	13	37.46	6	2	53.3	2	54.4	7.4615	8.167	2.42	3.21	17	19	26.5
18.8	1	13	41.36	13	41.57	6	3	14.8	3	15.9	7.4502	8.153	2.42	3.21	18	19	22.6
19.8	1	13	45.37	13	45.58	6	3	35.6	3	36.7	7.4386	8.138	2.42	3.21	19	19	18.8
20.8	1	13	49.27	13	49.47	6	3	55.8	3	56.8	7.4265	8.122	2.42	3.21	20	19	14.9
21.7	1	13	53.06	13	53.26	6	4	15.3	4	16.3	7.4140	8.106	2.43	3.22	21	19	11.1
22.7	1	13	56.73	13	56.92	6	4	34.0	4	34.9	7.4010	8.089	2.43	3.22	22	19	7.2
23.7	1	14	0.30	14	0.49	6	4	52.1	4	53.0	7.3875	8.071	2.43	3.22	23	19	3.4
24.7	1	14	3.76	14	3.94	6	5	9.5	5	10.4	7.3734	8.053	2.43	3.22	24	18	59.5
25.7	1	14	7.10	14	7.28	6	5	26.1	5	26.9	7.3588	8.034	2.44	3.23	25	18	55.6
26.7	1	14	10.33	14	10.50	6	5	42.0	5	42.8	7.3434	8.014	2.44	3.23	26	18	51.7
27.7	1	14	13.45	14	13.61	6	5	57.2	5	58.0	7.3274	7.993	2.44	3.23	27	18	47.8
28.7	1	14	16.45	14	16.60	6	6	11.7	6	12.4	7.3108	7.970	2.44	3.23	28	18	43.9
29.7	1	14	19.34	14	19.49	6	6	25.5	6	26.2	7.2935	7.946	2.45	3.24	29	18	40.0
30.7	1	14	22.11	14	22.25	6	6	38.6	6	39.2	7.2755	7.921	2.45	3.24	30	18	36.1
31.7	1	14	24.77	14	24.91	+6	6	51.0	6	51.6	+7.2561	+7.894	-2.45	-3.24	31	18	32.2

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.				Apparent Declination.				Log of <i>a</i> .		Log of <i>b</i> .		Mean Solar Time of Meridian Transit.		
	At Sidereal Oh.		At Transit.		At Sidereal Oh.		At Transit.		In R. A.	In Dec.	In R. A.	In Dec.			
July	d	h	m	s	m	s	°	'	°	'			d	h	m
1.7	1	14	24.77	14 24.91	+6	6 51.0	6	51.6	+7.2561	+7.894	-2.45	-3.24	1	18	32.2
2.7	1	14	27.31	14 27.44	6	7 2.7	7	3.3	7.2361	7.865	2.45	3.24	2	18	28.4
3.7	1	14	29.73	14 29.85	6	7 13.6	7	14.1	7.2150	7.834	2.45	3.24	3	18	24.5
4.7	1	14	32.03	14 32.15	6	7 23.7	7	24.2	7.1929	7.801	2.46	3.25	4	18	20.6
5.7	1	14	34.21	14 34.32	6	7 33.1	7	33.5	7.1690	7.765	2.46	3.25	5	18	16.7
6.7	1	14	36.27	14 36.37	6	7 41.8	7	42.2	7.1438	7.725	2.46	3.25	6	18	12.8
7.7	1	14	38.22	14 38.32	6	7 49.8	7	50.2	7.1170	7.680	2.46	3.25	7	18	8.9
8.7	1	14	40.05	14 40.14	6	7 57.0	7	57.3	7.0884	7.630	2.46	3.25	8	18	5.0
9.7	1	14	41.75	14 41.84	6	8 3.5	8	3.8	7.0578	7.574	2.46	3.25	9	18	1.1
10.7	1	14	43.33	14 43.41	6	8 9.3	8	9.6	7.0249	7.509	2.46	3.25	10	17	57.2
11.7	1	14	44.79	14 44.86	6	8 14.3	8	14.5	6.9886	7.429	2.46	3.25	11	17	53.3
12.7	1	14	46.14	14 46.21	6	8 18.6	8	18.8	6.9489	7.340	2.46	3.25	12	17	49.3
13.7	1	14	47.36	14 47.42	6	8 22.2	8	22.3	6.9061	7.222	2.46	3.25	13	17	45.4
14.7	1	14	48.46	14 48.51	6	8 25.0	8	25.1	6.8587	7.066	2.46	3.25	14	17	41.5
15.7	1	14	49.44	14 49.49	6	8 27.0	8	27.1	6.8043	6.819	2.46	3.25	15	17	37.6
16.7	1	14	50.29	14 50.33	6	8 28.3	8	28.3	6.7420	+6.143	2.46	3.25	16	17	33.7
17.7	1	14	51.02	14 51.06	6	8 28.9	8	28.9	6.6710	-6.562	2.46	3.25	17	17	29.8
18.7	1	14	51.63	14 51.66	6	8 28.7	8	28.7	6.5860	6.939	2.46	3.25	18	17	25.9
19.7	1	14	52.12	14 52.14	6	8 27.8	8	27.7	6.4776	7.143	2.46	3.25	19	17	22.0
20.7	1	14	52.50	14 52.52	6	8 26.2	8	26.1	6.3330	7.277	2.46	3.25	20	17	18.0
21.7	1	14	52.75	14 52.76	6	8 23.8	8	23.7	6.1204	7.379	2.46	3.25	21	17	14.1
22.7	1	14	52.88	14 52.88	6	8 20.7	8	20.6	+5.6710	7.462	2.46	3.25	22	17	10.2
23.7	1	14	52.89	14 52.89	6	8 16.9	8	16.7	-5.1618	7.532	2.46	3.24	23	17	6.3
24.7	1	14	52.77	14 52.76	6	8 12.4	8	12.2	6.0784	7.592	2.46	3.24	24	17	2.3
25.7	1	14	52.53	14 52.52	6	8 7.2	8	7.0	6.3115	7.644	2.46	3.24	25	16	58.4
26.7	1	14	52.17	14 52.15	6	8 1.2	8	1.0	6.4597	7.690	2.46	3.24	26	16	54.4
27.7	1	14	51.70	14 51.67	6	7 54.5	7	54.2	6.5700	7.731	2.46	3.24	27	16	50.5
28.6	1	14	51.11	14 51.08	6	7 47.1	7	46.8	6.6579	7.770	2.46	3.24	28	16	46.5
29.6	1	14	50.39	14 50.35	6	7 39.0	7	38.6	6.7324	7.804	2.46	3.24	29	16	42.6
30.6	1	14	49.55	14 49.50	6	7 30.2	7	29.8	6.7935	7.836	2.46	3.24	30	16	38.6
31.6	1	14	48.59	14 48.54	6	7 20.6	7	20.2	6.8481	7.866	2.45	3.23	31	16	34.7
Aug. 1.6	1	14	47.52	14 47.46	6	7 10.3	7	9.8	6.8976	7.894	2.45	3.23	1	16	30.7
2.6	1	14	46.32	14 46.26	6	6 59.3	6	58.8	6.9403	7.920	2.45	3.23	2	16	26.8
3.6	1	14	45.01	14 44.94	6	6 47.6	6	47.1	6.9792	7.945	2.45	3.23	3	16	22.8
4.6	1	14	43.58	14 43.50	6	6 35.3	6	34.7	7.0148	7.968	2.45	3.23	4	16	18.9
5.6	1	14	42.03	14 41.95	6	6 22.4	6	21.8	7.0471	7.990	2.45	3.22	5	16	14.9
6.6	1	14	40.37	14 40.28	6	6 8.7	6	8.0	7.0772	8.011	2.44	3.22	6	16	10.9
7.6	1	14	38.59	14 38.49	6	5 54.3	5	53.6	7.1053	8.030	2.44	3.22	7	16	7.0
8.6	1	14	36.70	14 36.60	6	5 39.2	5	38.5	7.1317	8.048	2.44	3.21	8	16	3.0
9.6	1	14	34.69	14 34.58	6	5 23.4	5	22.6	7.1561	8.065	2.44	3.21	9	15	59.0
10.6	1	14	32.57	14 32.46	6	5 6.9	5	6.1	7.1791	8.082	2.44	3.20	10	15	55.0
11.6	1	14	30.34	14 30.22	6	4 49.8	4	49.0	7.2010	8.098	2.43	3.20	11	15	51.1
12.6	1	14	28.00	14 27.88	6	4 32.1	4	31.2	7.2214	8.113	2.43	3.19	12	15	47.1
13.6	1	14	25.54	14 25.41	6	4 13.7	4	12.8	7.2408	8.128	2.43	3.19	13	15	43.1
14.6	1	14	22.97	14 22.84	6	3 54.7	3	53.7	7.2595	8.142	2.42	3.18	14	15	39.1
15.6	1	14	20.29	14 20.15	6	3 35.0	3	34.0	7.2774	8.155	2.42	3.18	15	15	35.2
16.6	1	14	17.51	14 17.37	6	3 14.7	3	13.7	7.2942	8.168	2.41	3.17	16	15	31.2
17.6	1	14	14.63	14 14.48	6	2 53.8	2	52.7	7.3104	8.181	2.41	3.17	17	15	27.2
18.6	1	14	11.64	14 11.49	6	2 32.3	2	31.2	7.3255	8.193	2.40	3.16	18	15	23.2
19.6	1	14	8.54	14 8.38	6	2 10.2	2	9.1	7.3403	8.204	2.40	3.16	19	15	19.2
20.6	1	14	5.33	14 5.17	6	1 47.4	1	46.2	7.3545	8.215	2.39	3.15	20	15	15.2
21.6	1	14	2.02	14 1.85	6	1 24.0	1	22.8	7.3680	8.225	2.39	3.15	21	15	11.2
22.6	1	13	58.61	13 58.44	8	1 0.0	0	58.8	7.3808	8.235	2.38	3.14	22	15	7.3
23.6	1	13	55.10	13 54.92	6	0 35.5	0	34.3	7.3928	8.245	2.38	3.14	23	15	3.3
24.6	1	13	51.50	13 51.32	6	0 10.5	0	9.2	7.4046	8.254	2.37	3.13	24	14	59.3
25.6	1	13	47.79	13 47.60	5	59 45.0	59	43.7	7.4160	8.263	2.36	3.12	25	14	55.3
26.6	1	13	43.99	13 43.80	5	59 18.9	59	17.6	7.4268	8.272	2.36	3.12	26	14	51.3
27.6	1	13	40.09	13 39.89	5	58 52.3	58	51.0	7.4372	8.280	2.35	3.11	27	14	47.4
28.6	1	13	36.10	13 35.90	5	58 25.2	58	23.8	7.4472	8.288	2.35	3.10	28	14	43.4
29.6	1	13	32.03	13 31.82	5	57 57.5	57	56.1	7.4568	8.296	2.34	3.09	29	14	39.4
30.6	1	13	27.86	13 27.65	5	57 29.3	57	27.9	7.4662	8.303	2.34	3.09	30	14	35.4
31.6	1	13	23.60	13 23.38	+5	57 0.6	56	59.2	-7.4751	-8.310	-2.33	-3.08	31	14	31.4

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.		Apparent Declination.		Log of $\alpha$ .		Log of $\delta$ .		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Sidereal Ch.	At Transit.	In R.A.	In Dec.	In R.A.	In Dec.	
Sept. 1.6	d h m s	m s	° ' " "	' "					d h m
1.6	1 13 19.26	13 19.04	+5 56 31.4	56 30.0	-7.4838	-8.317	-2.32	-3.07	1 14 27.4
2.5	1 13 14.83	13 14.60	5 56 1.8	56 0.3	7.4922	8.324	2.31	3.06	2 14 23.3
3.5	1 13 10.31	13 10.08	5 55 31.7	55 30.2	7.5002	8.330	2.30	3.05	3 14 19.3
4.5	1 13 5.71	13 5.47	5 55 1.1	54 59.6	7.5080	8.336	2.29	3.04	4 14 15.3
5.5	1 13 1.03	13 0.79	5 54 30.1	54 28.6	7.5154	8.342	2.28	3.03	5 14 11.3
6.5	1 12 56.28	12 56.04	5 53 58.7	53 57.1	7.5226	8.348	2.27	3.02	6 14 7.3
7.5	1 12 51.45	12 51.20	5 53 26.9	53 25.3	7.5294	8.353	2.26	3.01	7 14 3.3
8.5	1 12 46.54	12 46.29	5 52 54.6	52 53.0	7.5359	8.358	2.25	2.99	8 13 59.2
9.5	1 12 41.56	12 41.31	5 52 21.9	52 20.3	7.5421	8.363	2.24	2.98	9 13 55.2
10.5	1 12 36.50	12 36.24	5 51 48.8	51 47.1	7.5482	8.368	2.22	2.96	10 13 51.2
11.5	1 12 31.37	12 31.11	5 51 15.3	51 13.6	7.5539	8.373	2.21	2.95	11 13 47.2
12.5	1 12 26.18	12 25.92	5 50 41.5	50 39.8	7.5592	8.377	2.20	2.93	12 13 43.1
13.5	1 12 20.93	12 20.67	5 50 7.4	50 5.7	7.5647	8.381	2.19	2.91	13 13 39.1
14.5	1 12 15.62	12 15.35	5 49 33.0	49 31.3	7.5698	8.385	2.17	2.89	14 13 35.1
15.5	1 12 10.25	12 9.98	5 48 58.2	48 56.5	7.5747	8.389	2.16	2.87	15 13 31.1
16.5	1 12 4.82	12 4.55	5 48 23.1	48 21.4	7.5793	8.392	2.14	2.85	16 13 27.0
17.5	1 11 59.32	11 59.05	5 47 47.7	47 46.0	7.5837	8.395	2.13	2.83	17 13 23.0
18.5	1 11 53.76	11 53.48	5 47 12.0	47 10.2	7.5881	8.398	2.11	2.81	18 13 19.0
19.5	1 11 48.15	11 47.87	5 46 36.0	46 34.2	7.5922	8.401	2.09	2.79	19 13 15.0
20.5	1 11 42.49	11 42.21	5 45 59.8	45 58.0	7.5960	8.404	2.07	2.77	20 13 10.9
21.5	1 11 36.79	11 36.51	5 45 23.4	45 21.6	7.5998	8.407	2.05	2.75	21 13 6.9
22.5	1 11 31.04	11 30.76	5 44 46.8	44 45.0	7.6034	8.410	2.03	2.72	22 13 2.9
23.5	1 11 25.24	11 24.96	5 44 10.0	44 8.2	7.6066	8.412	2.01	2.70	23 12 58.9
24.5	1 11 19.40	11 19.11	5 43 33.0	43 31.2	7.6097	8.414	1.98	-2.67	24 12 54.8
25.5	1 11 13.52	11 13.23	5 42 55.7	42 53.9	7.6127	8.416	1.95		25 12 50.8
26.5	1 11 7.60	11 7.31	5 42 18.2	42 16.4	7.6156	8.418	1.92		26 12 46.8
27.5	1 11 1.64	11 1.35	5 41 40.6	41 38.8	7.6182	8.420	1.89		27 12 42.8
28.5	1 10 55.65	10 55.36	5 41 2.9	41 1.0	7.6205	8.421	1.85		28 12 38.7
29.5	1 10 49.62	10 49.33	5 40 25.0	40 23.1	7.6227	8.422	1.82		29 12 34.7
30.5	1 10 43.56	10 43.27	5 39 47.0	39 45.1	7.6246	8.423	1.78		30 12 30.7
Oct. 1.5	1 10 37.48	10 37.19	5 39 8.9	39 7.0	7.6264	8.424	1.74		1 12 26.6
2.5	1 10 31.38	10 31.08	5 38 30.7	38 28.8	7.6281	8.425	1.70		2 12 22.6
3.5	1 10 25.26	10 24.96	5 37 52.4	37 50.5	7.6295	8.426	-1.66		3 12 18.6
4.5	1 10 19.12	10 18.82	5 37 14.0	37 12.1	7.6307	8.426			4 12 14.5
5.5	1 10 12.96	10 12.66	5 36 35.6	36 33.7	7.6317	8.426			5 12 10.5
6.5	1 10 6.79	10 6.49	5 35 57.1	35 55.2	7.6327	8.426			6 12 6.5
7.5	1 10 0.60	10 0.30	5 35 18.6	35 16.7	7.6334	8.426			7 12 2.4
8.5	1 9 54.40	9 54.10	5 34 40.1	34 38.2	7.6341	8.426			8 11 58.4
9.4	1 9 48.20	9 47.90	5 34 1.7	33 59.8	7.6345	8.426			9 11 54.4
10.4	1 9 41.99	9 41.69	5 33 23.3	33 21.4	7.6346	8.425			10 11 50.3
11.4	1 9 35.78	9 35.48	5 32 45.0	32 43.1	7.6347	8.424			11 11 46.3
12.4	1 9 29.57	9 29.27	5 32 6.8	32 5.0	7.6347	8.423			12 11 42.3
13.4	1 9 23.36	9 23.06	5 31 28.7	31 26.9	7.6346	8.422			13 11 38.2
14.4	1 9 17.16	9 16.86	5 30 50.7	30 48.9	7.6343	8.421			14 11 34.2
15.4	1 9 10.97	9 10.67	5 30 12.8	30 11.0	7.6335	8.420			15 11 30.2
16.4	1 9 4.78	9 4.48	5 29 35.0	29 33.2	7.6327	8.419			16 11 26.1
17.4	1 8 58.60	8 58.30	5 28 57.3	28 55.5	7.6316	8.417			17 11 22.1
18.4	1 8 52.44	8 52.15	5 28 19.8	28 18.0	7.6304	8.415			18 11 18.1
19.4	1 8 46.30	8 46.01	5 27 42.4	27 40.6	7.6290	8.413	+1.66		19 11 14.0
20.4	1 8 40.18	8 39.89	5 27 5.2	27 3.4	7.6275	8.411	1.71	+2.68	20 11 10.0
21.4	1 8 34.08	8 33.79	5 26 28.2	26 26.4	7.6259	8.409	1.75	2.71	21 11 6.0
22.4	1 8 28.01	8 27.72	5 25 51.4	25 49.6	7.6241	8.406	1.79	2.74	22 11 1.9
23.4	1 8 21.97	8 21.68	5 25 14.9	25 13.1	7.6221	8.403	1.84	2.77	23 10 57.9
24.4	1 8 15.96	8 15.67	5 24 38.6	24 36.9	7.6200	8.400	1.88	2.79	24 10 53.9
25.4	1 8 9.98	8 9.70	5 24 2.6	24 0.9	7.6177	8.397	1.92	2.82	25 10 49.9
26.4	1 8 4.03	8 3.75	5 23 26.8	23 25.1	7.6150	8.394	1.95	2.84	26 10 45.8
27.4	1 7 58.11	7 57.83	5 22 51.3	22 49.6	7.6124	8.390	1.98	2.87	27 10 41.8
28.4	1 7 52.23	7 51.95	5 22 16.1	22 14.4	7.6094	8.386	2.01	2.89	28 10 37.8
29.4	1 7 46.39	7 46.11	5 21 41.2	21 39.5	7.6062	8.382	2.03	2.91	29 10 33.8
30.4	1 7 40.60	7 40.32	5 21 6.6	21 5.0	7.6028	8.378	2.05	2.93	30 10 29.7
31.4	1 7 34.86	7 34.59	5 20 32.4	20 30.8	7.5992	8.374	2.07	2.95	31 10 25.7
32.4	1 7 29.16	7 28.89	+5 19 58.6	19 57.0	-7.5954	-8.369	+2.09	+2.96	32 10 21.7

## FOR WASHINGTON SIDEREAL NOON AND MERIDIAN TRANSIT.

Day of Month.	Apparent Right Ascension.			Apparent Declination.		Log of a.		Log of b.		Mean Solar Time of Meridian Transit.
	At Sidereal Oh.	At Transit.	At Transit.	At Sidereal Oh.	At Transit.	In R. A.	In Dec.	In R. A.	In Dec.	
Nov. 1.4	d h m s	m s	m s	° ' "	° ' "	—7.5954	—8.369	+2.09	+2.96	d h m
2.4	1 7 29.16	7 28.89	7 28.89	+5 19 58.6	19 57.0	—7.5913	8.364	2.11	2.98	1 10 21.7
3.4	1 7 23.52	7 23.25	7 23.25	5 19 25.2	19 23.6	7.5872	8.359	2.13	2.99	2 10 17.7
4.4	1 7 17.93	7 17.67	7 17.67	5 18 52.1	18 50.5	7.5826	8.353	2.15	3.00	3 10 13.6
5.4	1 7 12.39	7 12.13	7 12.13	5 18 19.4	18 17.9	7.5781	8.347	2.16	3.01	4 10 9.6
6.4	1 7 6.91	7 6.65	7 6.65	5 17 47.1	17 45.6	7.5730	8.341	2.18	3.03	5 10 5.6
7.4	1 7 1.49	7 1.23	7 1.23	5 17 15.2	17 13.7	7.5677	8.335	2.19	3.04	6 10 1.6
8.4	1 6 56.13	6 55.87	6 55.87	5 16 43.8	16 42.3	7.5624	8.329	2.21	3.05	7 9 57.5
9.4	1 6 50.84	6 50.59	6 50.59	5 16 12.9	16 11.5	7.5569	8.323	2.22	3.06	8 9 53.5
10.4	1 6 45.62	6 45.37	6 45.37	5 15 42.4	15 41.0	7.5509	8.316	2.24	3.07	9 9 49.5
11.4	1 6 40.47	6 40.22	6 40.22	5 15 12.4	15 11.0	7.5447	8.308	2.25	3.08	10 9 45.5
12.4	1 6 35.39	6 35.15	6 35.15	5 14 42.9	14 41.5	7.5383	8.300	2.26	3.09	11 9 41.4
13.4	1 6 30.37	6 30.13	6 30.13	5 14 13.9	14 12.6	7.5316	8.292	2.27	3.10	12 9 37.4
14.4	1 6 25.43	6 25.20	6 25.20	5 13 45.3	13 44.0	7.5247	8.284	2.28	3.11	13 9 33.4
15.3	1 6 20.57	6 20.34	6 20.34	5 13 17.2	13 15.9	7.5175	8.275	2.29	3.12	14 9 29.4
16.3	1 6 15.79	6 15.57	6 15.57	5 12 49.7	12 48.4	7.5100	8.266	2.30	3.13	15 9 25.3
17.3	1 6 11.09	6 10.87	6 10.87	5 12 22.9	12 21.7	7.5023	8.257	2.31	3.14	16 9 21.3
18.3	1 6 6.47	6 6.26	6 6.26	5 11 56.7	11 55.5	7.4942	8.247	2.32	3.15	17 9 17.3
19.3	1 6 1.93	6 1.72	6 1.72	5 11 31.0	11 29.8	7.4856	8.237	2.33	3.16	18 9 13.3
20.3	1 5 57.48	5 57.28	5 57.28	5 11 5.8	11 4.6	7.4766	8.227	2.34	3.17	19 9 9.3
21.3	1 5 53.12	5 52.92	5 52.92	5 10 41.2	10 40.1	7.4673	8.216	2.35	3.17	20 9 5.3
22.3	1 5 48.86	5 48.67	5 48.67	5 10 17.2	10 16.1	7.4576	8.204	2.36	3.18	21 9 1.3
23.3	1 5 44.69	5 44.50	5 44.50	5 9 53.8	9 52.7	7.4475	8.192	2.37	3.19	22 8 57.3
24.3	1 5 40.61	5 40.43	5 40.43	5 9 31.0	9 30.0	7.4372	8.179	2.38	3.20	23 8 53.3
25.3	1 5 36.62	5 36.44	5 36.44	5 9 8.9	9 7.9	7.4263	8.166	2.38	3.20	24 8 49.3
26.3	1 5 32.72	5 32.55	5 32.55	5 8 47.5	8 46.5	7.4149	8.152	2.39	3.21	25 8 45.3
27.3	1 5 28.92	5 28.75	5 28.75	5 8 26.7	8 25.8	7.4031	8.138	2.40	3.21	26 8 41.3
28.3	1 5 25.23	5 25.07	5 25.07	5 8 6.6	8 5.7	7.3906	8.124	2.41	3.22	27 8 37.4
29.3	1 5 21.64	5 21.48	5 21.48	5 7 47.1	7 46.2	7.3779	8.109	2.41	3.22	28 8 33.4
30.3	1 5 18.16	5 18.01	5 18.01	5 7 28.2	7 27.4	7.3645	8.093	2.42	3.23	29 8 29.4
Dec. 1.3	1 5 14.78	5 14.63	5 14.63	5 7 10.0	7 9.2	7.3502	8.076	2.42	3.23	30 8 25.4
2.3	1 5 11.50	5 11.36	5 11.36	5 6 52.5	6 51.7	7.3351	8.057	2.43	3.24	1 8 21.4
3.3	1 5 8.33	5 8.19	5 8.19	5 6 35.8	6 35.0	7.3195	8.037	2.43	3.24	2 8 17.4
4.3	1 5 5.26	5 5.13	5 5.13	5 6 19.8	6 19.1	7.3033	8.016	2.44	3.24	3 8 13.4
5.3	1 5 2.30	5 2.17	5 2.17	5 6 4.5	6 3.8	7.2860	7.994	2.44	3.25	4 8 9.5
6.3	1 4 59.46	4 59.34	4 59.34	5 5 49.9	5 49.2	7.2678	7.971	2.45	3.25	5 8 5.5
7.3	1 4 56.74	4 56.62	4 56.62	5 5 36.0	5 35.3	7.2486	7.946	2.45	3.25	6 8 1.5
8.3	1 4 54.14	4 54.03	4 54.03	5 5 22.9	5 22.3	7.2286	7.920	2.45	3.25	7 7 57.5
9.3	1 4 51.65	4 51.54	4 51.54	5 5 10.6	5 10.0	7.2076	7.892	2.45	3.26	8 7 53.6
10.3	1 4 49.27	4 49.17	4 49.17	5 4 59.0	4 58.4	7.1851	7.862	2.46	3.26	9 7 49.6
11.3	1 4 47.01	4 46.91	4 46.91	5 4 48.1	4 47.6	7.1613	7.829	2.46	3.26	10 7 45.6
12.3	1 4 44.86	4 44.77	4 44.77	5 4 38.0	4 37.5	7.1361	7.793	2.46	3.26	11 7 41.7
13.3	1 4 42.83	4 42.74	4 42.74	5 4 28.7	4 28.3	7.1088	7.754	2.46	3.26	12 7 37.7
14.3	1 4 40.92	4 40.84	4 40.84	5 4 20.1	4 19.7	7.0797	7.711	2.47	3.27	13 7 33.8
15.3	1 4 39.13	4 39.05	4 39.05	5 4 12.3	4 11.9	7.0478	7.663	2.47	3.27	14 7 29.8
16.3	1 4 37.47	4 37.40	4 37.40	5 4 5.3	4 5.0	7.0134	7.609	2.47	3.27	15 7 25.9
17.3	1 4 35.93	4 35.86	4 35.86	5 3 59.1	3 58.8	6.9752	7.545	2.47	3.27	16 7 21.9
18.3	1 4 34.51	4 34.45	4 34.45	5 3 53.7	3 53.4	6.9333	7.473	2.47	3.27	17 7 18.0
19.3	1 4 33.21	4 33.15	4 33.15	5 3 49.0	3 48.8	6.8869	7.383	2.48	3.28	18 7 14.0
20.3	1 4 32.04	4 31.99	4 31.99	5 3 45.1	3 44.9	6.8340	7.269	2.48	3.28	19 7 10.1
21.2	1 4 31.00	4 30.95	4 30.95	5 3 42.0	3 41.9	6.7736	7.120	2.48	3.28	20 7 6.1
22.2	1 4 30.09	4 30.05	4 30.05	5 3 39.7	3 39.6	6.7035	6.883	2.48	3.28	21 7 2.2
23.2	1 4 29.30	4 29.26	4 29.26	5 3 38.2	3 38.1	6.6198	—6.353	2.48	3.28	22 6 58.2
24.2	1 4 28.63	4 28.60	4 28.60	5 3 37.5	3 37.5	6.5184	+6.495	2.48	3.28	23 6 54.3
25.2	1 4 28.09	4 28.06	4 28.06	5 3 37.6	3 37.6	6.3826	6.930	2.48	3.28	24 6 50.3
26.2	1 4 27.68	4 27.66	4 27.66	5 3 38.5	3 38.5	6.1841	7.143	2.48	3.27	25 6 46.4
27.2	1 4 27.40	4 27.38	4 27.38	5 3 40.1	3 40.2	—5.8078	7.285	2.48	3.27	26 6 42.4
28.2	1 4 27.25	4 27.24	4 27.24	5 3 42.4	3 42.5	+5.3535	7.392	2.48	3.27	27 6 38.5
29.2	1 4 27.23	4 27.22	4 27.22	5 3 45.5	3 45.7	6.9458	7.478	2.48	3.27	28 6 34.5
30.2	1 4 27.33	4 27.33	4 27.33	5 3 49.4	3 49.6	6.3003	7.547	2.47	3.26	29 6 30.6
31.2	1 4 27.55	4 27.56	4 27.56	5 3 54.1	3 54.3	6.4597	7.697	2.47	3.26	30 6 26.7
32.2	1 4 27.90	4 27.92	4 27.92	5 3 59.6	3 59.9	+6.5761	+7.658	+2.47	+3.26	31 6 22.8
32.2	1 4 28.38	4 28.40	4 28.40	+5 4 5.9	4 6.2					32 6 18.8

## HORIZONTAL PARALLAXES AND SEMIDIAMETERS.

Mean N on.	HORIZONTAL PARALLAXES.			SEMIDIAMETERS.			SID. TIME OF SEMIDIAMETER PASSING THE MERIDIAN.		
	♂	♀	♂	♂	♀	♂	♂	♀	♂
Jan. 1	6.96	6.32	9.90	2.32	6.31	5.88	0.17	0.45	0.40
6	6.04	6.21	10.42	2.35	6.19	6.14	0.17	0.44	0.42
11	6.17	6.11	10.85	2.41	6.09	6.39	0.17	0.44	0.44
16	6.42	5.99	11.28	2.49	5.97	6.64	0.18	0.43	0.46
21	6.77	5.90	11.68	2.64	5.87	6.88	0.18	0.42	0.47
26	7.34	5.81	12.03	2.87	5.78	7.09	0.19	0.42	0.49
31	8.20	5.73	12.32	3.20	5.70	7.26	0.21	0.41	0.50
Feb. 5	9.44	5.64	12.53	3.68	5.61	7.38	0.25	0.40	0.51
10	11.05	5.56	12.65	4.29	5.55	7.45	0.29	0.40	0.52
15	12.54	5.49	12.66	4.91	5.48	7.45	0.33	0.39	0.52
20	13.52	5.43	12.57	5.24	5.41	7.40	0.35	0.38	0.52
25	13.32	5.37	12.37	5.19	5.36	7.29	0.35	0.37	0.51
Mar. 2	12.41	5.32	12.09	4.83	5.30	7.12	0.33	0.36	0.50
7	11.32	5.27	11.75	4.41	5.25	6.93	0.31	0.36	0.49
12	10.33	5.22	11.37	4.02	5.20	6.70	0.28	0.35	0.47
17	9.48	5.18	10.96	3.69	5.16	6.45	0.26	0.35	0.46
22	8.78	5.14	10.53	3.42	5.12	6.20	0.24	0.34	0.44
27	8.19	5.10	10.10	3.19	5.08	5.95	0.22	0.34	0.42
April 1	7.71	5.07	9.68	3.00	5.05	5.70	0.20	0.34	0.40
6	7.30	5.04	9.27	2.84	5.02	5.47	0.19	0.33	0.39
11	6.97	5.02	8.89	2.72	5.00	5.24	0.18	0.33	0.37
16	6.70	5.00	8.53	2.61	4.98	5.02	0.18	0.33	0.35
21	6.53	4.98	8.19	2.54	4.96	4.82	0.17	0.34	0.34
26	6.45	4.97	7.87	2.51	4.95	4.63	0.17	0.34	0.32
May 1	6.51	4.96	7.57	2.54	4.94	4.46	0.17	0.34	0.31
6	6.76	4.95	7.29	2.63	4.93	4.29	0.18	0.34	0.30
11	7.21	4.95	7.04	2.81	4.93	4.14	0.20	0.34	0.29
16	7.87	4.95	6.80	3.06	4.93	4.00	0.22	0.35	0.28
21	8.72	4.96	6.58	3.39	4.94	3.88	0.25	0.35	0.27
26	9.73	4.97	6.38	3.79	4.95	3.76	0.28	0.36	0.26
31	10.91	4.98	6.19	4.24	4.97	3.65	0.32	0.36	0.25
June 5	12.20	5.00	6.01	4.75	4.98	3.55	0.35	0.36	0.24
10	13.50	5.03	5.85	5.26	5.01	3.45	0.38	0.37	0.23
15	14.64	5.05	5.70	5.70	5.04	3.36	0.40	0.37	0.23
20	15.32	5.09	5.56	5.97	5.07	3.28	0.42	0.37	0.22
25	15.31	5.13	5.42	5.96	5.11	3.20	0.42	0.37	0.21
30	14.54	5.17	5.30	5.66	5.15	3.12	0.38	0.37	0.21
July 5	13.24	5.22	5.19	5.16	5.19	3.05	0.36	0.37	0.20
10	11.75	5.27	5.09	4.57	5.25	2.99	0.32	0.37	0.20
15	10.29	5.33	4.99	4.00	5.31	2.93	0.28	0.37	0.20
20	9.01	5.39	4.89	3.51	5.37	2.88	0.25	0.37	0.19
25	7.98	5.46	4.80	3.11	5.44	2.83	0.23	0.38	0.19
30	7.21	5.54	4.72	2.81	5.52	2.78	0.21	0.38	0.19
Aug. 4	6.70	5.62	4.65	2.61	5.61	2.74	0.19	0.38	0.18
9	6.42	5.71	4.58	2.50	5.69	2.69	0.18	0.38	0.18
14	6.30	5.81	4.51	2.45	5.79	2.65	0.17	0.39	0.18
19	6.30	5.91	4.45	2.45	5.89	2.62	0.17	0.39	0.18
24	6.39	6.02	4.39	2.49	6.00	2.58	0.17	0.40	0.17
29	6.53	6.14	4.34	2.54	6.12	2.55	0.17	0.41	0.17
Sept. 3	6.75	6.28	4.29	2.63	6.25	2.52	0.17	0.42	0.17
8	7.03	6.42	4.24	2.72	6.38	2.49	0.18	0.42	0.17
13	7.39	6.57	4.20	2.87	6.54	2.47	0.19	0.44	0.17
18	7.80	6.71	4.15	3.05	6.69	2.44	0.20	0.46	0.17
23	8.40	6.89	4.11	3.27	6.86	2.42	0.22	0.47	0.17
28	9.13	7.07	4.08	3.55	7.04	2.40	0.25	0.49	0.17
Oct. 3	10.05	7.27	4.04	3.91	7.24	2.38	0.28	0.51	0.17
8	11.15	7.47	4.01	4.34	7.45	2.37	0.31	0.53	0.17
13	12.27	7.70	3.99	4.77	7.67	2.35	0.33	0.55	0.17
18	12.87	7.94	3.96	5.01	7.91	2.33	0.34	0.57	0.17
23	12.34	8.20	3.94	4.79	8.17	2.32	0.32	0.59	0.17

HORIZONTAL PARALLAXES AND SEMIDIAMETERS.									
Mean Noon.	HORIZONTAL PARALLAXES.			SEMIDIAMETERS.			SID. TIME OF SEMIDIAMETER PASSING THE MERIDIAN.		
	♂	♀	♂	♂	♀	♂	♂	♀	♂
Oct. 28	10.85	8.48	3.91	4.23	8.46	2.30	0.28	0.62	0.17
Nov. 2	9.29	8.79	3.89	3.61	8.76	2.28	0.24	0.65	0.17
7	8.12	9.13	3.86	3.16	9.10	2.27	0.22	0.68	0.17
12	7.32	9.50	3.84	2.84	9.46	2.27	0.20	0.70	0.17
17	6.78	9.90	3.83	2.64	9.86	2.26	0.18	0.73	0.17
22	6.41	10.33	3.81	2.49	10.29	2.24	0.17	0.76	0.16
27	6.18	10.80	3.79	2.40	10.76	2.23	0.17	0.79	0.16
Dec. 2	6.02	11.33	3.78	2.34	11.29	2.23	0.17	0.82	0.16
7	5.94	11.93	3.77	2.32	11.88	2.22	0.17	0.85	0.16
12	5.92	12.58	3.75	2.30	12.53	2.21	0.17	0.89	0.16
17	5.95	13.31	3.74	2.31	13.25	2.20	0.17	0.93	0.16
22	6.05	14.12	3.73	2.36	14.07	2.20	0.17	0.98	0.16
27	6.22	15.02	3.71	2.42	14.97	2.19	0.18	1.03	0.16
32	6.49	16.05	3.70	2.52	15.99	2.18	0.18	1.09	0.16
Mean Noon.	♂	h	♂	♂	h	♂	♂	h	♂
Jan. 1	1.74	0.79	0.48	19.45	7.20	1.88	1.35	0.51	0.12
11	1.69	0.80	0.48	18.85	7.27	1.88	1.31	0.52	0.12
21	1.64	0.80	0.48	18.31	7.35	1.88	1.27	0.54	0.12
31	1.59	0.81	0.48	17.83	7.44	1.87	1.24	0.55	0.12
Feb. 10	1.55	0.83	0.48	17.41	7.54	1.86	1.21	0.57	0.12
20	1.52	0.84	0.47	17.05	7.66	1.85	1.18	0.58	0.11
Mar. 2	1.49	0.85	0.47	16.75	7.78	1.84	1.16	0.59	0.11
12	1.47	0.87	0.47	16.51	7.91	1.82	1.15	0.60	0.11
22	1.46	0.88	0.46	16.33	8.05	1.81	1.14	0.61	0.11
April 1	1.45	0.90	0.46	16.21	8.18	1.80	1.13	0.62	0.11
11	1.44	0.91	0.46	16.15	8.30	1.78	1.13	0.63	0.11
21	1.44	0.92	0.45	16.14	8.42	1.76	1.13	0.64	0.11
May 1	1.44	0.93	0.45	16.18	8.52	1.75	1.14	0.65	0.11
11	1.45	0.94	0.44	16.28	8.60	1.74	1.15	0.65	0.11
21	1.46	0.95	0.44	16.42	8.65	1.72	1.16	0.66	0.11
31	1.48	0.95	0.44	16.62	8.67	1.71	1.18	0.66	0.10
June 10	1.51	0.95	0.44	16.88	8.67	1.71	1.20	0.66	0.10
20	1.54	0.95	0.43	17.19	8.64	1.70	1.23	0.66	0.10
30	1.57	0.94	0.43	17.56	8.58	1.70	1.26	0.65	0.10
July 10	1.61	0.93	0.43	17.99	8.50	1.70	1.29	0.65	0.10
20	1.65	0.92	0.43	18.47	8.40	1.70	1.33	0.64	0.10
30	1.70	0.91	0.44	19.01	8.28	1.70	1.37	0.63	0.10
Aug. 9	1.75	0.89	0.44	19.59	8.16	1.71	1.41	0.62	0.10
19	1.80	0.88	0.45	20.21	8.03	1.72	1.46	0.61	0.11
29	1.86	0.86	0.45	20.86	7.89	1.73	1.51	0.60	0.11
Sept. 8	1.92	0.85	0.45	21.54	7.76	1.74	1.56	0.59	0.11
18	1.98	0.84	0.45	22.19	7.64	1.75	1.60	0.58	0.11
28	2.03	0.83	0.46	22.89	7.52	1.77	1.64	0.57	0.11
Oct. 8	2.08	0.81	0.46	23.32	7.42	1.78	1.68	0.56	0.11
18	2.11	0.80	0.46	23.73	7.33	1.80	1.71	0.56	0.11
28	2.14	0.80	0.47	23.98	7.25	1.82	1.72	0.55	0.11
Nov. 7	2.15	0.79	0.47	24.06	7.19	1.83	1.72	0.55	0.11
17	2.14	0.79	0.47	23.95	7.14	1.85	1.71	0.54	0.11
27	2.11	0.78	0.47	23.67	7.11	1.86	1.69	0.54	0.12
Dec. 7	2.07	0.78	0.48	23.23	7.09	1.87	1.66	0.54	0.12
17	2.02	0.78	0.48	22.67	7.10	1.88	1.62	0.54	0.12
27	1.96	0.79	0.48	22.03	7.12	1.89	1.57	0.54	0.12
37	1.90	0.79	0.48	21.33	7.15	1.89	1.52	0.55	0.12

NOTE.—For Neptune the Horizontal Parallax = 0".28 (between Jan. 22 and June 22.)  
 " " " " = 0".29 (before Jan. 22, between June 22 and Aug. 27, and after Nov. 21.)  
 " " " " = 0".30 (between Aug. 27 and Nov. 21.)

# SUN'S COÖRDINATES, 1869. 389

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.				
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .	
Jan. 1.0	+1945463	5979	-8841563	1328	-3836014	6291	281° 24' 43.8	54.9	-0.01	926528	
1.5	2031108	1620	-8825387	5149	-3828992	9266	281 55 18.2	29.2	+0.06	926548	
2.0	2116598	7105	-8808525	8284	-3821673	1945	282 25 52.6	63.6	0.12	926575	
2.5	2201927	2430	-8790979	0735	-3814058	4328	282 56 27.1	38.0	0.18	926609	
3.0	2287089	7587	-8772749	2502	-3806147	6415	283 27 1.6	12.4	0.23	926650	
3.5	2372077	2571	-8753835	3585	-3797940	8205	283 57 36.2	46.9	0.28	926697	
4.0	2456885	7374	-8734240	3988	-3789437	9700	284 28 10.8	21.4	0.32	926750	
4.5	2541506	1989	-8713965	3710	-3780639	0900	284 58 45.5	56.0	0.36	926809	
5.0	2625933	6413	-8693011	2754	-3771547	1806	285 29 20.2	30.6	0.40	926874	
5.5	2710159	0635	-8671379	1119	-3762161	2417	285 59 54.9	65.3	0.43	926945	
6.0	2794179	4650	-8649071	8809	-3752482	2736	286 30 29.6	39.9	0.46	927021	
6.5	2877985	8452	-8626088	5823	-3742510	2761	287 1 4.3	14.6	0.47	927102	
7.0	2961570	2032	-8602432	2165	-3732247	2496	287 31 39.0	49.2	0.48	927188	
7.5	3044927	5384	-8578104	7835	-3721693	1939	288 2 13.8	23.9	0.48	927279	
8.0	3128049	8501	-8553107	2836	-3710849	1093	288 32 48.5	58.5	0.47	927375	
8.5	3210931	1379	-8527442	7169	-3699715	9956	289 3 23.3	33.2	0.45	927476	
9.0	3293565	4008	-8501110	0835	-3688292	8531	289 33 58.0	67.8	0.43	927581	
9.5	3375944	6382	-8474113	3836	-3676581	6817	290 4 32.7	42.4	0.40	927691	
10.0	3458063	8496	-8446454	6175	-3664582	4816	290 35 7.4	17.0	0.36	927805	
10.5	3539914	0343	-8418135	7854	-3652298	2529	291 5 42.0	51.5	0.32	927923	
11.0	3621489	1913	-8389157	8875	-3639729	9957	291 36 16.5	26.0	0.27	928046	
11.5	3702781	3200	-8359522	9238	-3626875	7101	292 6 50.9	60.4	0.22	928173	
12.0	3783784	4198	-8329233	8948	-3613737	3961	292 37 25.2	34.6	0.16	928304	
12.5	3864492	4901	-8298292	8004	-3600316	0537	293 7 59.4	68.7	0.10	928439	
13.0	3944897	5301	-8266703	6415	-3586614	6833	293 38 33.5	42.7	+0.04	928578	
13.5	4024994	5393	-8234467	4178	-3572632	2849	294 9 7.5	16.6	-0.02	928721	
14.0	4104775	5169	-8201589	1299	-3558371	8586	294 39 41.3	50.3	0.09	928868	
14.5	4184235	4624	-8168071	7780	-3543833	4045	295 10 15.0	23.9	0.16	929018	
15.0	4263367	3752	-8133915	3623	-3529019	9229	295 40 48.5	57.4	0.23	929172	
15.5	4342164	2544	-8099125	8832	-3513930	4138	296 11 21.9	30.7	0.30	929331	
16.0	4420620	0995	-8063705	3411	-3498567	8773	296 41 55.1	63.8	0.36	929494	
16.5	4498729	9099	-8027658	7362	-3482932	3135	297 12 28.0	36.7	0.42	929661	
17.0	4576485	6850	-7990986	0691	-3467025	7226	297 43 0.7	9.3	0.47	929833	
17.5	4653881	4241	-7953694	3398	-3450849	1048	298 13 33.2	41.7	0.52	930009	
18.0	4730911	1266	-7915784	5488	-3434404	4601	298 44 5.5	13.9	0.57	930190	
18.5	4807570	7920	-7877260	6964	-3417692	7887	299 14 37.6	45.9	0.61	930376	
19.0	4883851	4196	-7838125	7828	-3400715	0908	299 45 9.4	17.6	0.65	930567	
19.5	4959749	0089	-7798384	8088	-3383474	3665	300 15 40.9	49.0	0.68	930763	
20.0	5035258	5593	-7758039	7743	-3365970	6158	300 46 12.2	20.2	0.70	930964	
20.5	5110373	0702	-7717095	6799	-3348206	8391	301 16 43.2	51.2	0.71	931171	
21.0	5185089	5413	-7675556	5260	-3330183	0366	301 47 14.0	21.9	0.72	931383	
21.5	5259399	9718	-7633424	3128	-3311903	2084	302 17 44.5	52.3	0.71	931601	
22.0	5333299	3613	-7590704	0408	-3293368	3547	302 48 14.7	22.5	0.70	931825	
22.5	5406784	7093	-7547398	7102	-3274579	4756	303 18 44.6	52.4	0.68	932055	
23.0	5479848	0152	-7503510	3214	-3255537	5712	303 49 14.3	22.0	0.65	932291	
23.5	5552486	2785	-7459044	8748	-3236245	6418	304 19 43.7	51.3	0.62	932533	
24.0	5624694	4988	-7414004	3709	-3216703	6874	304 50 12.9	20.4	0.59	932781	
24.5	5696466	6755	-7368393	8098	-3196913	7081	305 20 41.8	49.2	0.55	933036	
25.0	5767796	8080	-7322215	1921	-3176876	7042	305 51 10.5	17.8	0.50	933297	
25.5	5838679	8958	-7275474	5180	-3156594	6758	306 21 38.9	46.1	0.45	933564	
26.0	5909112	9385	-7228172	7879	-3136069	6231	306 52 7.1	14.2	0.39	933837	
26.5	5979088	9357	-7180313	0020	-3115302	5461	307 22 35.0	42.0	0.33	934118	
27.0	6048604	8868	-7131902	1610	-3094295	4452	307 53 2.6	9.5	0.27	934404	
27.5	6117654	7913	-7082943	2651	-3073050	3205	308 23 30.0	36.8	0.21	934697	
28.0	6186233	6488	-7033439	3148	-3051569	1722	308 53 57.1	63.9	0.14	934996	
28.5	6254336	4586	-6983392	3101	-3029853	0003	309 24 24.0	30.8	-0.07	935302	
29.0	6321958	2204	-6932808	2518	-3007903	8051	309 54 50.7	57.4	0.00	935614	
29.5	6389095	9336	-6881689	1400	-2985721	5867	310 25 17.1	23.8	+0.06	935933	
30.0	6455742	5979	-6830038	9750	-2963309	3453	310 55 43.3	49.9	0.12	936258	
30.5	6521894	2126	-6777860	7573	-2940669	0811	311 26 9.3	15.8	0.18	936589	
31.0	+6587545	7773	-6725159	4873	-2917802	7942	311 56 35.0	41.4	+0.23	936926	

NOTE.—The accented letters correspond to the mean equinox and equator of January 0d.0.

# 390 SUN'S COÖRDINATES, 1869.

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.				
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .	
Jan. 31.5	+6652692	2916	-6671938	1653	-2894709	4847	312° 27' 0.5	6.8	+0.28	937269	
Feb. 1.0	.6717329	7549	.6618200	7916	.2871393	1529	312 57 25.8	32.1	0.32	937617	
1.5	.6781451	1667	.6563950	3667	.2847855	7988	313 27 50.9	57.2	0.35	937971	
2.0	.6845055	5267	.6509193	8911	.2824097	4228	313 58 15.8	22.0	0.38	938330	
2.5	.6908133	8341	.6453932	3651	.2800121	0250	314 28 40.5	46.6	0.40	938694	
3.0	.6970682	0886	.6398171	7893	.2775928	6055	314 59 4.9	11.0	0.41	939063	
3.5	.7032696	2896	.6341913	1636	.2751519	1644	315 29 29.1	35.1	0.41	939437	
4.0	.7094170	4366	.6285164	4888	.2726897	7020	315 59 53.0	59.0	0.41	939815	
4.5	.7155099	5291	.6227927	7652	.2702064	2185	316 30 16.7	22.6	0.40	940198	
5.0	.7215478	5667	.6170206	9933	.2677021	7140	317 0 40.2	46.0	0.38	940585	
5.5	.7275303	5488	.6112005	1733	.2651771	1888	317 31 3.5	9.2	0.35	940976	
6.0	.7334569	4751	.6053330	3069	.2626315	6430	318 1 26.5	32.2	0.32	941371	
6.5	.7393270	3448	.5994185	3916	.2600656	0769	318 31 49.2	54.9	0.28	941770	
7.0	.7451402	1577	.5934574	4307	.2574796	4906	319 2 11.7	17.3	0.24	942172	
7.5	.7508961	9132	.5874502	4236	.2548736	8844	319 32 33.9	39.4	0.19	942578	
8.0	.7565941	6109	.5813974	3710	.2522478	2584	320 2 55.8	61.3	0.14	942987	
8.5	.7622338	2503	.5752994	2731	.2496025	6129	320 33 17.4	22.9	0.08	943399	
9.0	.7678148	8310	.5691569	1308	.2469378	9480	321 3 38.7	44.1	+0.02	943814	
9.5	.7733366	3525	.5629702	9442	.2442540	2640	321 33 59.7	65.0	-0.05	944232	
10.0	.7787986	8141	.5567398	7140	.2415513	5611	322 4 20.4	25.6	0.12	944652	
10.5	.7842004	2156	.5504664	4407	.2388299	8395	322 34 40.7	45.9	0.19	945075	
11.0	.7895416	5465	.5441504	1249	.2360901	0995	323 5 0.7	5.8	0.25	945500	
11.5	.7948218	8363	.5377925	7671	.2333321	3413	323 35 20.3	25.3	0.31	945928	
12.0	.8000406	0548	.5313931	3679	.2305560	5649	324 5 39.5	44.5	0.37	946359	
12.5	.8051976	2115	.5249528	9278	.2277621	7708	324 35 58.3	63.3	0.43	946793	
13.0	.8102924	3060	.5184722	4474	.2249507	0292	325 6 16.8	21.7	0.48	947229	
13.5	.8153245	3377	.5119517	9270	.2221220	1303	325 36 34.9	39.7	0.53	947667	
14.0	.8202938	3067	.5053920	3675	.2192761	2842	326 6 52.5	57.3	0.58	948108	
14.5	.8251999	2125	.4987935	7693	.2164135	4214	326 37 9.7	14.5	0.62	948551	
15.0	.8300423	0546	.4921569	1329	.2135344	5422	327 7 26.5	31.2	0.66	948997	
15.5	.8348206	8326	.4854827	4589	.2106389	6465	327 37 42.8	47.5	0.69	949447	
16.0	.8395346	5463	.4787715	7479	.2077274	7348	328 7 58.7	63.3	0.72	949899	
16.5	.8441839	1953	.4720238	0004	.2047999	8071	328 38 14.1	18.7	0.73	950354	
17.0	.8487682	7793	.4652403	2171	.2018568	8638	329 8 29.1	33.6	0.74	950812	
17.5	.8532873	2981	.4584214	3984	.1988982	9050	329 38 43.6	48.1	0.74	951273	
18.0	.8577408	7513	.4515678	5450	.1959247	9313	330 8 57.6	62.1	0.73	951738	
18.5	.8621284	1386	.4446800	6574	.1929363	9427	330 39 11.2	15.6	0.71	952206	
19.0	.8664500	4600	.4377585	7361	.1899311	9394	331 9 24.3	28.6	0.69	952678	
19.5	.8707053	7150	.4308039	7817	.1869155	9216	331 39 36.9	41.2	0.65	953154	
20.0	.8748939	9033	.4238168	7948	.1838838	8898	332 9 49.1	53.3	0.61	953633	
20.5	.8790157	0248	.4167978	7760	.1808381	8439	332 40 0.8	4.9	0.57	954116	
21.0	.8830702	0791	.4097473	7257	.1777788	7844	333 10 11.9	16.0	0.52	954603	
21.5	.8870574	0660	.4026658	6444	.1747060	7113	333 40 22.5	26.6	0.47	955095	
22.0	.8909769	9853	.3955539	5327	.1716201	6252	334 10 32.7	36.7	0.41	955591	
22.5	.8948286	8367	.3884122	3913	.1685212	5260	334 40 42.4	46.4	0.35	956091	
23.0	.8986122	6201	.3812412	2205	.1654096	4144	335 10 51.6	55.5	0.29	956595	
23.5	.9023276	3352	.3740414	0209	.1622855	2901	335 41 0.4	4.3	0.22	957104	
24.0	.9059745	9819	.3668134	7931	.1591493	1538	336 11 8.8	12.6	0.15	957617	
24.5	.9095527	5598	.3595577	5376	.1560010	0053	336 41 16.7	20.5	0.09	958135	
25.0	.9130620	0689	.3522749	2551	.1528410	8452	337 11 24.2	27.9	-0.02	958657	
25.5	.9165022	5088	.3449655	9459	.1496694	6734	337 41 31.2	34.9	+0.05	959184	
26.0	.9198730	8794	.3376300	6108	.1464864	4901	338 11 37.7	41.4	0.11	959715	
26.5	.9231743	1805	.3302690	2500	.1432924	2959	338 41 43.8	47.4	0.17	960251	
27.0	.9264057	4117	.3228829	8642	.1400876	0910	339 11 49.4	53.0	0.22	960791	
27.5	.9295672	5729	.3154723	4538	.1368721	8753	339 41 54.6	58.1	0.27	961336	
28.0	.9326585	6640	.3080378	0196	.1336462	6493	340 11 59.4	62.8	0.32	961885	
28.5	.9356793	6846	.3005798	5618	.1304102	4131	340 42 3.8	7.1	0.36	962438	
Mar. 1.0	.9386294	6345	.2930989	0812	.1271643	1671	341 12 7.8	11.1	0.39	962995	
1.5	.9415088	5137	.2855955	5780	.1239087	9113	341 42 11.4	14.7	0.41	963556	
2.0	.9443170	3217	.2780703	0531	.1206437	6461	342 12 14.6	17.9	0.43	964120	
2.5	+9470539	0584	-2705238	5069	-1173694	3717	342 42 17.4	20.6	+0.44	964687	

NOTE.—: denotes a change in the preceding figure.



# SUN'S COÖRDINATES, 1869. 391

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .
Mar. 3.0	+ .9497194	7237	— .2629564	9398	— .1140861	0882	343 12 19.8	22.9	+0.44	965258
3.5	.9523132	3173	.2553687	3524	.1107941	7969	343 42 21.7	24.8	0.43	965832
4.0	.9548350	8389	.2477613	7453	.1074936	4954	344 12 23.2	26.3	0.41	966409
4.5	.9572847	2884	.2401348	1191	.1041849	1865	344 42 24.4	27.4	0.39	966989
5.0	.9596621	6657	.2324898	4744	.1008682	8697	345 12 25.2	28.1	0.36	967571
5.5	.9619670	9704	.2248269	8118	.0975437	5450	345 42 25.6	28.5	0.33	968156
6.0	.9641991	2023	.2171467	1320	.0942117	2128	346 12 25.6	28.5	0.29	968742
6.5	.9663584	3614	.2094496	4352	.0908724	8733	346 42 25.2	28.0	0.25	969330
7.0	.9684446	4475	.2017363	7221	.0875261	5269	347 12 24.4	27.1	0.20	969920
7.5	.9704576	6603	.1940074	9935	.0841730	1736	347 42 23.1	25.8	0.14	970512
8.0	.9723973	3999	.1862634	2497	.0808135	8140	348 12 21.4	24.1	0.08	971105
8.5	.9742634	2658	.1785051	4917	.0774478	4482	348 42 19.3	21.9	+0.02	971700
9.0	.9760559	0582	.1707330	7198	.0740762	0764	349 12 16.8	19.3	—0.05	972295
9.5	.9777745	7766	.1629477	9348	.0706988	6989	349 42 13.8	16.3	0.12	972891
10.0	.9794191	4211	.1551500	1373	.0673159	3157	350 12 10.4	12.9	0.18	973488
10.5	.9809896	9915	.1473404	3280	.0639278	9275	350 42 6.5	9.0	0.24	974085
11.0	.9824859	4877	.1395195	5074	.0605348	5343	351 12 2.2	4.7	0.30	974683
11.5	.9839079	9095	.1316879	6761	.0571372	1366	351 41 57.5	59.9	0.36	975281
12.0	.9852554	2569	.1238464	8348	.0537352	7344	352 11 52.3	54.6	0.42	975879
12.5	.9865283	5297	.1159954	9841	.0503291	3282	352 41 46.5	48.8	0.47	976478
13.0	.9877267	7280	.1081356	1245	.0469192	9182	353 11 40.2	42.5	0.52	977076
13.5	.9888604	8616	.1002676	2568	.0435058	5047	353 41 33.5	35.7	0.56	977675
14.0	.9898995	9005	.0923921	3815	.0400891	0877	354 11 26.3	28.4	0.60	978273
14.5	.9908738	8747	.0845096	4993	.0366693	6678	354 41 18.5	20.6	0.63	978872
15.0	.9917733	7741	.0766210	6110	.0332468	2471	355 11 10.2	12.2	0.66	979471
15.5	.9925981	5988	.0687267	7171	.0298219	8201	355 41 1.3	3.3	0.68	980070
16.0	.9933480	3486	.0608275	8181	.0263949	3929	356 10 51.9	53.9	0.69	980669
16.5	.9940232	0237	.0529240	9149	.0229659	9638	356 40 42.0	43.9	0.69	981268
17.0	.9946226	6240	.0450169	0080	.0195352	5330	357 10 31.5	33.4	0.69	981867
17.5	.9951493	1496	.0371068	0982	.0161031	1008	357 40 20.4	22.3	0.67	982466
18.0	.9956002	6004	.0291942	1859	.0126700	6674	358 10 8.8	10.6	0.65	983066
18.5	.9959763	9764	.0212798	2718	.0092360	2333	358 39 56.6	58.4	0.62	983667
19.0	.9962778	2779	.0133643	3563	.0058015	7986	359 9 43.8	45.6	0.59	984268
19.5	.9965046	5046	— .0054481	4406	— .0023667	3637	359 39 37.5	32.2	0.55	984870
20.0	.9966569	6568	+ .0024680	4753	+ .0010681	0713	0 9 16.5	18.2	0.50	985473
20.5	.9967347	7336	.0103836	3906	.0045027	5060	0 39 2.0	3.6	0.45	986077
21.0	.9967382	7380	.0182980	3048	.0079368	9402	1 8 46.9	48.5	0.39	986682
21.5	.9966674	6672	.0262107	2172	.0113702	3737	1 38 31.2	32.8	0.33	987288
22.0	.9965224	5221	.0341212	1274	.0148027	8065	2 8 15.0	16.5	0.27	987895
22.5	.9963032	3029	.0420287	0346	.0182340	2379	2 37 58.2	59.6	0.21	988503
23.0	.9960100	0096	.0499328	9385	.0216637	6678	3 7 40.8	42.2	0.14	989113
23.5	.9956428	6424	.0578329	8385	.0250916	0958	3 37 22.8	24.2	—0.07	989725
24.0	.9952017	2013	.0657284	7335	.0285176	5220	4 7 4.2	5.6	0.00	990338
24.5	.9946868	6864	.0736188	6235	.0319414	9459	4 36 45.1	46.4	+0.07	990953
25.0	.9940983	0978	.0815035	5080	.0353627	3673	5 6 25.4	26.7	0.13	991570
25.5	.9934363	4358	.0893820	3862	.0387813	7860	5 36 5.2	6.4	0.19	992189
26.0	.9927008	7003	.0972538	2577	.0421969	2019	6 5 44.4	45.6	0.24	992809
26.5	.9918918	8913	.1051183	1219	.0456394	6145	6 35 23.2	24.4	0.29	993431
27.0	.9910095	0089	.1129750	9784	.0490185	0238	7 5 1.5	2.6	0.34	994055
27.5	.9900540	0534	.1208233	8264	.0524239	4293	7 34 39.2	40.3	0.38	994681
28.0	.9890253	0247	.1286628	6656	.0558253	8309	8 4 16.4	17.4	0.42	995308
28.5	.9879236	9230	.1364928	4953	.0592226	2283	8 33 53.1	54.0	0.45	995937
29.0	.9867490	7483	.1443120	3152	.0626156	6215	9 3 29.2	30.1	0.47	996568
29.5	.9855016	5009	.1521226	1246	.0660040	0099	9 33 4.9	5.8	0.48	997200
30.0	.9841816	1809	.1599213	9230	.0693875	3937	10 2 40.1	41.0	0.48	997834
30.5	.9827889	7882	.1677083	7097	.0727661	7724	10 32 14.9	15.7	0.48	998469
31.0	.9813237	3230	.1754832	4844	.0761395	1460	11 1 49.2	50.0	0.47	999105
31.5	.9797861	7854	.1832454	2463	.0795073	5139	11 31 23.1	23.8	0.45	999742
Apr. 1.0	.9781761	1754	.1909944	9950	.0828693	8761	12 0 56.5	57.2	0.43	000379
1.5	.9764939	4932	.1987296	7299	.0862255	2324	12 30 29.5	30.2	0.40	001018
2.0	+ .9747396	7389	+ .2064504	4505	+ .0895752	5821	13 0 2.0	2.6	+0.37	001656

◆ The first figures of this and the following logarithms are 0.0.

# 392 SUN'S COÖRDINATES, 1869.

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .
Apr. 2.5	+9729133	9126	+2141564	1562	+0929185	9256	13 29 34.1	34.7	+0.32	0.002295
3.0	.9710151	0145	.2218470	8465	.0962550	2622	13 59 5.8	6.3	0.27	0.02933
3.5	.9690452	0446	.2295216	5207	.0995846	5919	14 28 37.0	37.5	0.22	0.03572
4.0	.9670037	0032	.2371998	1786	.1029069	9144	14 58 7.7	8.2	0.16	0.04210
4.5	.9648907	8902	.2448210	8195	.1062217	2293	15 27 38.0	38.4	0.10	0.04848
5.0	.9627064	7060	.2524444	4424	.1095289	5367	15 57 7.9	8.2	+0.03	0.05485
5.5	.9604510	4506	.2600495	0474	.1128281	8360	16 26 37.3	37.6	-0.03	0.06121
6.0	.9581246	1243	.2676358	6334	.1161191	1271	16 56 6.3	6.6	0.10	0.06756
6.5	.9557274	7272	.2752027	2000	.1194017	4098	17 25 34.9	35.1	0.16	0.07389
7.0	.9532596	2595	.2827495	7465	.1226756	6839	17 55 3.0	3.1	0.23	0.08021
7.5	.9507213	7213	.2902757	2724	.1259405	9490	18 20 30.6	30.7	0.29	0.08651
8.0	.9481126	1126	.2977807	7771	.1291962	2048	18 53 57.8	57.8	0.35	0.09279
8.5	.9454338	4338	.3052639	2600	.1324425	4512	19 23 24.5	24.5	0.41	0.09905
9.0	.9428581	6852	.3127246	7204	.1356792	6881	19 52 50.8	50.7	0.46	0.10528
9.5	.9398667	8669	.3201624	1579	.1389060	9150	20 22 16.6	16.4	0.51	0.11149
10.0	.9369789	9792	.3275766	5718	.1421226	1317	20 51 41.9	41.7	0.55	0.11768
10.5	.9340219	0223	.3349666	9615	.1453288	3380	21 21 6.7	6.5	0.58	0.12384
11.0	.9309960	9965	.3423320	3266	.1485243	5337	21 50 31.1	30.8	0.61	0.12998
11.5	.9279015	9031	.3496722	6665	.1517089	7184	22 19 55.0	54.7	0.63	0.13609
12.0	.9247387	7394	.3569866	9806	.1548823	8920	22 49 18.4	18.0	0.64	0.14218
12.5	.9215077	5085	.3642747	2684	.1580443	0541	23 18 41.2	40.8	0.64	0.14824
13.0	.9182088	2097	.3715358	5291	.1611947	2046	23 48 3.5	3.0	0.64	0.15427
13.5	.9148424	8434	.3787694	7624	.1643332	3432	24 17 25.3	24.8	0.63	0.16027
14.0	.9114089	4101	.3859749	9674	.1674595	4696	24 46 46.6	46.0	0.62	0.16625
14.5	.9079086	9099	.3931518	1442	.1705735	5837	25 16 7.4	6.7	0.60	0.17220
15.0	.9043417	3431	.4002995	2916	.1736748	6852	25 45 27.6	26.9	0.57	0.17813
15.5	.9007087	7102	.4074176	4094	.1767633	7739	26 14 47.2	46.5	0.53	0.18403
16.0	.8970099	0116	.4145056	4972	.1798388	8495	26 44 6.3	5.5	0.49	0.18991
16.5	.8932457	2475	.4215630	5543	.1829010	9118	27 13 24.8	24.0	0.44	0.19576
17.0	.8894162	4182	.4285892	5802	.1859497	9607	27 42 42.8	41.9	0.38	0.20159
17.5	.8855219	5240	.4355837	5744	.1889847	9958	28 11 60.3	59.3	0.32	0.20740
18.0	.8815631	5654	.4425459	5364	.1920058	0170	28 41 17.2	16.2	0.26	0.21319
18.5	.8775403	5427	.4494756	4658	.1950128	0241	29 10 33.5	32.5	0.20	0.21897
19.0	.8734537	4563	.4563723	3622	.1980054	0169	29 39 49.2	48.2	0.13	0.22473
19.5	.8693038	3066	.4632356	2252	.2009835	9951	30 9 4.4	3.3	-0.06	0.23047
20.0	.8650908	0938	.4700648	0542	.2039468	9586	30 38 19.1	17.9	+0.01	0.23620
20.5	.8608152	8183	.4768594	8485	.2068951	9070	31 7 33.3	32.0	0.08	0.24192
21.0	.8564773	4806	.4836191	6080	.2098282	8403	31 36 46.9	45.6	0.14	0.24762
21.5	.8520775	0810	.4903435	3321	.2127461	7583	32 5 60.0	58.7	0.20	0.25331
22.0	.8476161	6198	.4970323	0207	.2156484	6607	32 35 12.5	11.2	0.26	0.25899
22.5	.8430935	0973	.5036850	6731	.2185350	5474	33 4 24.6	23.2	0.32	0.26466
23.0	.8385101	5141	.5103010	2889	.2214058	4184	33 33 36.2	34.7	0.37	0.27032
23.5	.8338662	8704	.5168801	8677	.2242604	2731	34 2 47.3	45.7	0.41	0.27598
24.0	.8291621	1665	.5234217	4091	.2270988	1116	34 31 57.8	56.2	0.45	0.28162
24.5	.8243982	4028	.5299255	9126	.2299207	9336	35 1 7.9	6.3	0.48	0.28726
25.0	.8195749	5797	.5363909	3777	.2327260	7392	35 30 17.5	15.9	0.51	0.29289
25.5	.8146925	6975	.5428177	8043	.2355145	5278	35 59 26.7	25.0	0.53	0.29851
26.0	.8097514	7566	.5492053	1917	.2382859	2903	36 28 35.4	33.6	0.54	0.30412
26.5	.8047519	7573	.5555535	5396	.2410401	0536	36 57 43.7	41.8	0.54	0.30973
27.0	.7996943	6999	.5618616	8475	.2437770	7907	37 26 51.5	49.6	0.54	0.31531
27.5	.7945791	5849	.5681294	1151	.2464964	5102	37 55 58.9	57.0	0.52	0.32090
28.0	.7894067	4128	.5743564	3419	.2491980	2119	38 25 5.9	4.0	0.50	0.32647
28.5	.7841775	1838	.5805422	5274	.2518816	8956	38 54 12.5	10.5	0.47	0.33204
29.0	.7788919	8984	.5866864	6714	.2545471	5613	39 23 18.6	16.5	0.43	0.33759
29.5	.7735500	5567	.5927886	7733	.2571944	2087	39 52 24.4	22.2	0.39	0.34313
30.0	.7681522	1592	.5988484	8330	.2598232	8377	40 21 29.7	27.5	0.34	0.34865
30.5	.7626989	7061	.6048653	8496	.2624335	4481	40 50 34.7	32.4	0.28	0.35415
May 1.0	.7571905	1980	.6108390	8231	.2650249	0397	41 19 39.3	36.9	0.22	0.35964
1.5	.7516274	6352	.6167689	7528	.2675974	6123	41 49 43.6	41.1	0.16	0.36511
2.0	.7460099	0180	.6226546	6383	.2701506	1656	42 17 47.5	45.0	0.10	0.37055
2.5	+7403383	3466	+6284957	4792	+2726845	6996	42 46 51.1	48.6	+0.04	0.37597

# SUN'S COÖRDINATES, 1869. 393

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .
May 3.0	+7346131	6217	+6342918	2751	+2751989	2142	43 15 54.3	51.7	-0.02	038135
3.5	7288347	8436	6400425	0256	2776935	7089	43 44 57.1	54.5	0.09	038671
4.0	7230035	0127	6457473	7302	2801684	1839	44 13 59.6	56.9	0.15	039204
4.5	7171199	1294	6514059	3886	2826231	6387	44 42 61.8	59.0	0.21	039734
5.0	7111844	1942	6570178	0002	2850576	0735	45 12 3.6	0.7	0.27	040260
5.5	7051973	2074	6625826	5648	2874717	4877	45 41 5.1	2.1	0.33	040783
6.0	6991592	1697	6680999	0819	2898652	8813	46 10 6.2	3.2	0.39	041303
6.5	6930704	0812	6735692	5510	2922378	2540	46 39 7.0	4.0	0.44	041818
7.0	6869314	9425	6789900	9716	2945895	6058	47 8 7.4	4.4	0.49	042329
7.5	6807426	7540	6843620	3434	2969201	9365	47 37 7.5	4.4	0.52	042836
8.0	6745046	5164	6896846	6659	2992292	2457	48 6 7.2	4.0	0.55	043339
8.5	6682177	2298	6949576	9387	3015169	5335	48 35 6.5	3.2	0.57	043837
9.0	6618825	8950	7001805	1614	3037829	7996	49 4 5.4	2.0	0.58	044330
9.5	6554994	5122	7053530	3337	3060270	0438	49 33 4.0	0.5	0.58	044818
10.0	6490689	0821	7104746	4552	3082491	2660	50 1 62.2	58.7	0.58	045301
10.5	6425916	6051	7155450	5254	3104489	4659	50 30 60.1	56.5	0.57	045779
11.0	6360679	0818	7205638	5440	3126265	6338	50 59 57.6	53.9	0.55	046253
11.5	6294985	5128	7255307	5107	3147815	7989	51 28 54.8	51.0	0.53	046722
12.0	6228838	8985	7304452	4251	3169139	9314	51 57 51.5	47.7	0.50	047186
12.5	6162243	2394	7353071	2868	3190235	0412	52 26 47.8	44.0	0.46	047645
13.0	6095206	5361	7401159	0955	3211101	1279	52 55 43.7	39.8	0.42	048100
13.5	6027733	7892	7448714	8508	3231735	1914	53 24 39.2	35.2	0.37	048549
14.0	5959829	9992	7495732	5525	3252136	2316	53 53 34.3	30.2	0.31	048994
14.5	5891499	1666	7542210	2001	3272304	2485	54 22 29.0	24.8	0.25	049434
15.0	5822748	2919	7588146	7936	3292237	2420	54 51 23.3	19.0	0.19	049869
15.5	5753581	3756	7633535	3324	3311934	2118	55 20 17.2	12.8	0.13	050299
16.0	5684005	4184	7678374	8162	3331392	1577	55 49 10.6	6.2	0.07	050725
16.5	5614024	4207	7722662	2449	3350611	0797	56 17 63.6	59.2	-0.01	051147
17.0	5543645	3832	7766396	6182	3369589	9777	56 46 56.3	51.8	+0.06	051564
17.5	5472873	3064	7809574	9359	3388325	8514	57 15 48.6	44.0	0.13	051977
18.0	5401714	1908	7852190	1974	3406819	7010	57 44 40.4	35.8	0.19	052386
18.5	5330173	0371	7894246	4030	3425068	5260	58 13 31.9	27.2	0.25	052792
19.0	5258256	8458	7935737	5520	3443073	3267	58 42 22.9	18.1	0.31	053194
19.5	5185968	6174	7976662	6443	3460832	1027	59 11 13.5	8.6	0.37	053593
20.0	5113315	3525	8017018	6798	3478343	8539	59 39 63.7	58.7	0.42	053989
20.5	5040302	0516	8056802	6582	3495606	5803	60 8 53.5	48.4	0.46	054381
21.0	4966934	7152	8096011	5790	3512619	2817	60 37 42.9	37.8	0.50	054770
21.5	4893216	3438	8134645	4424	3529382	9581	61 6 32.0	26.9	0.53	055156
22.0	4819154	9380	8172700	2479	3545894	6095	61 35 20.7	15.6	0.56	055538
22.5	4744752	4982	8210175	9954	3562154	2356	62 4 9.1	3.9	0.58	055918
23.0	4670016	0250	8247067	6845	3578161	8365	62 32 57.1	51.8	0.60	056296
23.5	4594951	5189	8283375	3153	3593915	4120	63 1 44.7	39.4	0.60	056670
24.0	4519563	9806	8319096	8874	3609413	9620	63 30 32.0	26.7	0.60	057041
24.5	4443855	4102	8354228	4006	3624654	4862	63 59 19.1	13.7	0.58	057409
25.0	4367833	8084	8388770	8548	3639638	9847	64 28 5.8	0.3	0.56	057775
25.5	4291502	1757	8422719	2497	3654365	4575	64 56 52.3	46.6	0.54	058138
26.0	4214867	5127	8456073	5851	3668835	9048	65 25 38.4	32.7	0.51	058499
26.5	4137933	8197	8488831	8609	3683046	3260	65 54 24.3	18.5	0.47	058857
27.0	4060705	0974	8520989	0767	3696996	7212	66 23 9.9	4.0	0.42	059212
27.5	3983191	3464	8552547	2325	3710684	0901	66 51 55.3	49.3	0.37	059564
28.0	3905393	5671	8583502	3281	3724110	4329	67 20 40.4	34.3	0.32	059914
28.5	3827318	7600	8613850	3629	3737274	7494	67 49 25.3	19.1	0.26	060260
29.0	3748970	9257	8643590	3369	3750174	0395	68 18 10.0	3.7	0.20	060603
29.5	3670354	0646	8672721	2500	3762810	3032	68 46 54.4	48.1	0.14	060943
30.0	3591476	1773	8701239	1019	3775180	5404	69 15 38.7	32.3	+0.07	061280
30.5	3512341	2642	8729143	8923	3787284	7509	69 44 22.8	16.3	-0.00	061613
31.0	3432955	3261	8756432	6213	3799120	9347	70 13 6.7	0.1	0.06	061942
31.5	3353323	3634	8783101	2883	3810688	0916	70 41 50.3	43.7	0.12	062267
June 1.0	3273449	3765	8809150	8933	3821987	2217	71 10 33.7	27.0	0.18	062587
1.5	3193340	3661	8834576	4360	3833016	3247	71 39 17.0	10.2	0.24	062903
2.0	+3113001	3326	+8859378	9163	+3843774	4007	72 7 60.2	53.3	-0.29	063215

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Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .
June 2.5	+3032437	2767	+8883553	3339	+3854261	4495	72° 36' 43.2	36.2	-0.34	063522
3.0	2951656	1990	8907109	6887	3864475	4711	73 5 26.1	19.0	0.39	063825
3.5	2870660	0999	8930017	9805	3874415	4652	73 34 8.8	1.6	0.43	064123
4.0	2789458	9801	8952301	2090	3884081	4320	74 2 51.3	44.0	0.46	064415
4.5	2708055	8403	8973951	3741	3893473	3713	74 31 33.7	26.4	0.48	064702
5.0	2626457	6809	8994965	4757	3902589	2831	75 0 15.9	8.6	0.50	064984
5.5	2544668	5025	9015342	5135	3911429	1672	75 28 58.0	50.6	0.50	065260
6.0	2462695	3056	9035078	4873	3919992	0237	75 57 39.9	32.4	0.50	065531
6.5	2380545	0910	9054173	3969	3928277	8523	76 26 21.6	14.0	0.50	065796
7.0	2298224	8593	9072625	2423	3936283	6532	76 54 63.1	55.4	0.49	066054
7.5	2215738	6112	9090432	0232	3944010	4260	77 23 44.5	36.7	0.47	066306
8.0	2133094	3472	9107592	7394	3951456	1708	77 52 25.7	17.8	0.44	066552
8.5	2050297	0780	9124105	3909	3958621	8874	78 20 66.7	58.7	0.41	066791
9.0	1967354	7741	9139969	9775	3965506	5761	78 49 47.6	39.5	0.37	067024
9.5	1884272	4664	9155184	4992	3972110	2366	79 18 28.3	20.2	0.33	067251
10.0	1801057	1453	9169748	9758	3978432	8689	79 47 8.8	0.7	0.28	067471
10.5	1717714	8115	9183661	3472	3984470	4728	80 15 49.1	40.9	0.23	067685
11.0	1634249	4654	9196922	6737	3990225	0485	80 44 29.2	20.9	0.17	067893
11.5	1550669	1079	9209530	9347	3995698	5959	81 13 9.2	0.8	0.11	068095
12.0	1466981	7395	9221484	1304	4000888	1151	81 41 49.0	40.5	-0.04	068291
12.5	1383192	3611	9232784	2606	4005795	6059	82 10 28.5	19.9	+0.02	068481
13.0	1299309	9732	9243429	3254	4010418	0684	82 38 67.8	59.1	0.09	068665
13.5	1215336	5764	9253420	3247	4014756	5023	83 7 46.9	38.1	0.16	068843
14.0	1131281	1713	9262755	2585	4018810	9079	83 36 25.8	16.9	0.23	069015
14.5	1047149	7586	9271435	1268	4022579	2649	84 4 64.5	55.6	0.30	069181
15.0	0962948	3389	9279459	9295	4026063	6335	84 33 43.0	34.1	0.36	069342
15.5	0878683	9129	9286827	6666	4029263	9536	85 2 21.3	12.3	0.42	069497
16.0	0794359	4809	9293539	3381	4032178	2453	85 30 59.4	50.3	0.47	069647
16.5	0709983	0438	9299595	9440	4034808	5084	85 59 37.3	28.1	0.52	069792
17.0	0625561	6020	9304996	4844	4037154	7432	86 28 15.0	5.7	0.56	069931
17.5	0541100	1564	9309740	9501	4039215	9494	86 56 32.5	43.1	0.59	070066
18.0	0456605	7073	9313828	3682	4040991	1272	87 25 29.8	20.3	0.62	070197
18.5	0372081	2553	9317262	7119	4042482	2764	87 53 66.9	57.3	0.64	070323
19.0	0287535	8011	9320042	9903	4043689	3973	88 22 43.9	34.2	0.66	070445
19.5	0202972	3453	9322168	2032	4044611	4896	88 51 20.7	11.0	0.67	070563
20.0	0118397	8882	9323639	3507	4045249	5536	89 19 57.3	47.6	0.67	070677
20.5	+0033816	4305	9324456	4328	4045603	5892	89 48 33.8	24.0	0.66	070787
21.0	-00050765	0272	9324619	4495	4045673	5964	90 17 10.2	0.3	0.65	070892
21.5	0135341	4844	9324128	4008	4045459	5751	90 45 46.5	36.5	0.62	070994
22.0	0219906	9405	9322984	2868	4044961	5255	91 14 22.6	12.5	0.59	071092
22.5	0304455	3950	9321187	1075	4044179	4474	91 42 58.7	48.5	0.55	071187
23.0	0388980	8471	9318737	8629	4043114	3411	92 11 34.6	24.3	0.51	071278
23.5	0473477	2964	9315634	5530	4041765	2063	92 40 10.4	0.0	0.46	071365
24.0	0557941	7424	9311879	1779	4040134	0434	93 8 46.2	35.7	0.40	071448
24.5	0642366	1845	9307472	7376	4038219	8521	93 37 21.9	11.4	0.34	071528
25.0	0726746	6222	9302413	2322	4036021	6325	94 5 57.6	47.0	0.28	071604
25.5	0811075	0547	9296703	6616	4033540	3845	94 34 33.2	22.5	0.22	071677
26.0	0895349	4817	9290341	0259	4030777	1084	95 2 68.8	58.0	0.15	071746
26.5	0979562	9026	9283328	3250	4027732	8040	95 31 44.4	33.5	0.08	071812
27.0	1063707	3168	9275665	5592	4024404	4714	96 0 20.0	9.0	+0.02	071873
27.5	1147781	7238	9267352	7284	4020794	1105	96 28 55.6	44.5	-0.04	071931
28.0	1231777	1231	9258389	8326	4016903	7216	96 57 31.1	19.9	0.10	071985
28.5	1315689	5140	9248776	8718	4012730	3045	97 25 66.7	55.4	0.16	072034
29.0	1399513	8961	9238514	8461	4008275	8592	97 54 42.3	30.9	0.21	072079
29.5	1483243	2687	9227604	7556	4003539	3857	98 23 18.0	6.5	0.26	072120
30.0	1566873	6314	9216045	6002	3998521	8841	98 51 53.7	42.2	0.31	072156
30.5	1650397	9835	9203837	3799	3993222	3544	99 20 29.5	18.0	0.35	072188
July 1.0	1733810	3245	9190981	0948	3987643	7966	99 48 65.4	53.8	0.39	072215
1.5	1817105	6536	9177478	7450	3981784	2108	100 17 41.4	29.7	0.42	072238
2.0	1900276	9704	9163328	3306	3975644	5970	100 46 17.4	5.6	0.44	072255
2.5	-1983316	2741	+9148532	8515	+3969223	9551	101 14 53.4	41.5	-0.45	072266

# SUN'S COÖRDINATES, 1869. 395

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = p.
July 3.0	-2066220	5642	+9133089	3078	+3962523	2853	101° 43' 29.5"	17.5	-0.46	072271
3.5	-2148983	8402	.9117001	6995	.3955544	5876	102 11 65.7	53.6	0.46	072270
4.0	-2231197	1013	.9100269	0269	.3948284	8617	102 40 41.9	29.7	0.45	072264
4.5	-2314055	3468	.9082893	2898	.3940745	1080	103 9 18.2	6.0	0.43	072251
5.0	-2396353	5763	.9064874	4885	.3932928	3264	103 37 54.7	42.4	0.41	072232
5.5	-2478484	7891	.9046214	6231	.3924834	5171	104 6 31.2	18.8	0.38	072206
6.0	-2560441	9846	.9026913	6936	.3916463	6801	104 34 67.7	55.2	0.34	072174
6.5	-2642219	1621	.9006973	7002	.3907815	8155	105 3 44.3	31.7	0.30	072136
7.0	-2723-12	3212	.8986395	6430	.3898890	9231	105 32 21.0	8.3	0.25	072092
7.5	-2805213	4610	.8965181	5222	.3889680	10032	106 0 57.8	45.0	0.19	072041
8.0	-2886416	5811	.8943332	3379	.3880213	0557	106 29 34.6	21.7	0.13	071984
8.5	-2967416	6809	.8920850	0903	.3870463	0808	106 57 71.4	58.4	0.07	071920
9.0	-3048203	7594	.8897736	7795	.3860438	0784	107 26 48.2	35.2	-0.01	071850
9.5	-3128776	8164	.8873993	4058	.3850140	0488	107 55 25.1	12.0	+0.06	071773
10.0	-3209127	8513	.8849622	9694	.3839570	9919	108 23 62.1	48.9	0.13	071690
10.5	-3289250	8634	.8824625	4703	.3828729	9079	108 52 39.2	26.0	0.20	071600
11.0	-3369139	8521	.8799003	9088	.3817617	7968	109 21 16.3	3.0	0.26	071504
11.5	-3448788	8167	.8772759	2850	.3806234	6586	109 49 53.4	40.0	0.32	071401
12.0	-3528190	7567	.8745895	5993	.3794582	4935	110 18 30.6	17.1	0.38	071292
12.5	-3607341	6716	.8718413	8518	.3782662	3017	110 46 67.8	54.2	0.44	071177
13.0	-3686234	5607	.8690315	0427	.3770475	0831	111 15 45.0	31.3	0.50	071056
13.5	-3764863	4234	.8661694	1722	.3758022	8380	111 44 22.3	8.5	0.55	070929
14.0	-3843223	2592	.8632282	2407	.3745303	5662	112 12 59.6	45.7	0.59	070794
14.5	-3921307	0674	.8602352	2484	.3732319	4630	112 41 36.9	23.0	0.63	070654
15.0	-3999111	8477	.8571817	1956	.3719073	9435	113 10 14.2	0.2	0.66	070509
15.5	-4076629	5993	.8540679	0825	.3705565	5928	113 38 51.6	37.5	0.68	070358
16.0	-4153855	3218	.8508940	9093	.3691796	2150	114 7 29.9	14.9	0.70	070203
16.5	-4230784	0145	.8476603	6763	.3677768	8134	114 35 66.5	52.3	0.71	070043
17.0	-4307413	6773	.8443672	3819	.3663481	3848	115 4 44.0	29.7	0.71	069879
17.5	-4383734	3093	.8410148	0322	.3648936	9304	115 33 21.6	7.2	0.70	069710
18.0	-4459744	9102	.8376033	6114	.3634134	4503	116 1 59.2	44.7	0.68	069537
18.5	-4535437	4794	.8341330	1518	.3619077	9448	116 30 36.9	22.3	0.66	069360
19.0	-4610809	0165	.8306043	6239	.3603766	4138	116 59 14.7	0.0	0.63	069179
19.5	-4685855	5210	.8270174	0377	.3588202	8576	117 27 52.6	37.8	0.59	068993
20.0	-4760570	9925	.8233726	3936	.3572386	2761	117 56 30.6	15.7	0.55	068803
20.5	-4834949	4303	.8196700	6917	.3556320	6697	118 24 68.6	53.6	0.51	068609
21.0	-4908966	8340	.8159100	9325	.3540004	0382	118 53 46.8	31.7	0.46	068412
21.5	-4982675	2028	.8120928	1160	.3523440	3820	119 22 25.1	10.0	0.40	068211
22.0	-5056601	5366	.8082186	2425	.3506629	7010	119 50 63.5	48.3	0.34	068006
22.5	-5128995	8348	.8042876	3122	.3489571	9953	120 19 42.0	26.8	0.28	067798
23.0	-5201616	0969	.8003002	3256	.3472268	2651	120 48 29.7	5.5	0.22	067587
23.5	-5273872	3225	.7962567	2898	.3454722	5107	121 16 59.6	44.3	0.16	067373
24.0	-5345757	5110	.7921574	1842	.3436933	7319	121 45 38.6	23.2	0.09	067155
24.5	-5417267	6620	.7880024	0300	.3418903	9291	122 14 17.8	2.3	+0.02	066934
25.0	-5488398	7752	.7837920	8204	.3400632	1021	122 42 57.2	41.6	-0.04	066710
25.5	-5559144	8498	.7795264	5555	.3382122	2512	123 11 36.9	21.1	0.10	066482
26.0	-5629501	8856	.7752059	2358	.3363374	3765	123 40 16.7	0.9	0.16	066251
26.5	-5699464	8819	.7708307	8613	.3344390	4783	124 8 56.8	41.0	0.21	066016
27.0	-5769028	8384	.7664012	4326	.3325170	5564	124 37 37.1	21.3	0.26	065777
27.5	-5838189	7546	.7619176	9497	.3305715	6111	125 6 17.7	1.8	0.30	065535
28.0	-5906941	6299	.7573801	4130	.3286026	6423	125 34 58.5	42.6	0.34	065289
28.5	-5975280	4639	.7527889	8225	.3266107	6504	126 3 39.6	23.6	0.37	065039
29.0	-6043200	260	.7481445	1781	.3245952	6352	126 32 21.0	4.9	0.40	064786
29.5	-6110696	0057	.7434471	4822	.3225570	5972	127 0 62.7	46.5	0.42	064528
30.0	-6177764	7127	.7386969	7328	.3204960	5363	127 29 44.6	28.3	0.43	064266
30.5	-6244398	3762	.7338942	9308	.3184123	4527	127 58 26.8	10.4	0.43	064000
31.0	-6310593	9959	.7290393	0767	.3163069	3465	128 26 69.3	52.8	0.43	063730
31.5	-6376344	5711	.7241326	1707	.3141773	2180	128 55 52.1	35.5	0.42	063454
Aug. 1.0	-6441646	1115	.7191743	2132	.3120262	0669	129 24 35.2	18.6	0.40	063173
1.5	-6506494	5865	.7141648	2044	.3098529	8937	129 53 18.6	2.0	0.37	062888
2.0	-6570893	0256	.7091043	1447	.3076576	6985	130 21 62.3	45.6	-0.34	062597

# 396 SUN'S COÖRDINATES, 1869.

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = p.
Aug. 2.5	—6634807	4182	+7039932	0343	+3054404	4815	130° 50' 46.3	29.6	—0.30	0.62301
3.0	.6698262	7639	.6988318	8737	.3032013	2425	131 19 30.7	13.9	0.25	0.62000
3.5	.6761244	0623	.6936204	6630	.3009405	9818	131 47 75.3	58.4	0.20	0.61693
4.0	.6823747	3129	.6883595	4029	.2986583	6997	132 16 63.2	43.2	0.15	0.61381
4.5	.6885765	5149	.6830405	0940	.2963548	3963	132 45 45.4	28.3	0.09	0.61063
5.0	.6947295	6682	.6776907	7359	.2940301	0717	133 14 30.9	13.7	—0.03	0.60739
5.5	.7008330	7719	.6722835	3292	.2916844	7261	133 42 76.7	59.4	+0.03	0.60410
6.0	.7068865	8257	.6668282	8746	.2893179	3597	134 11 62.8	45.5	0.10	0.60075
6.5	.7128896	8291	.6613253	3725	.2869307	9726	134 40 49.2	31.9	0.17	0.59734
7.0	.7188418	7816	.6557752	8231	.2845230	5649	135 9 35.9	18.5	0.24	0.59387
7.5	.7247427	6828	.6501782	2269	.2820950	1370	135 38 22.9	5.4	0.30	0.59034
8.0	.7305916	5320	.6445347	5841	.2796468	6889	136 6 70.1	52.6	0.36	0.58676
8.5	.7363881	3288	.6388452	8954	.2771786	2208	136 35 57.6	40.0	0.42	0.58311
9.0	.7421318	0728	.6331102	1611	.2746907	7330	137 4 45.3	27.6	0.47	0.57941
9.5	.7478225	7638	.6273300	3816	.2721831	2255	137 33 33.3	15.5	0.52	0.57565
10.0	.7534596	4013	.6215052	5575	.2696562	6987	138 2 21.5	3.7	0.57	0.57183
10.5	.7590428	0848	.6156360	6891	.2671100	1526	138 30 70.0	52.2	0.61	0.56796
11.0	.7645716	5140	.6097231	7769	.2645448	5875	138 59 58.8	41.0	0.65	0.56404
11.5	.7700456	9883	.6037668	8213	.2619608	0036	139 28 47.9	30.0	0.67	0.56007
12.0	.7754644	4075	.5977677	8229	.2593581	4010	139 57 37.2	19.2	0.69	0.55605
12.5	.7808277	7712	.5917262	7822	.2567370	7799	140 26 26.7	8.7	0.70	0.55198
13.0	.7861351	0790	.5856427	6994	.2540977	1407	140 54 76.5	58.4	0.70	0.54787
13.5	.7913860	3303	.5795178	5752	.2514403	4834	141 23 66.6	48.4	0.69	0.54371
14.0	.7965803	5250	.5733519	4100	.2487651	8083	141 52 56.9	38.6	0.68	0.53952
14.5	.8017177	6628	.5671454	2042	.2460722	1155	142 21 47.4	29.1	0.66	0.53528
15.0	.8067976	7431	.5608988	0583	.2433619	4053	142 50 38.2	19.8	0.64	0.53100
15.5	.8118198	7657	.5546125	6727	.2406343	6778	143 19 29.2	10.8	0.61	0.52669
16.0	.8167839	7303	.5482869	3478	.2378897	9333	143 48 20.5	2.1	0.57	0.52234
16.5	.8216895	6363	.5419225	9841	.2351282	1719	144 16 72.1	53.6	0.52	0.51795
17.0	.8265365	4838	.5355150	5822	.2323500	3939	144 45 64.0	45.4	0.46	0.51353
17.5	.8313244	2721	.5290794	1424	.2295553	5991	145 14 56.2	37.6	0.40	0.50908
18.0	.8360530	0012	.5226015	6652	.2267444	7883	145 43 48.7	30.0	0.34	0.50460
18.5	.8407219	6706	.5160866	1510	.2239174	9614	146 12 41.5	22.7	0.28	0.50010
19.0	.8453310	2802	.5095352	6003	.2210746	1187	146 41 34.6	15.7	0.22	0.49557
19.5	.8498798	8295	.5029477	0135	.2182161	1693	147 10 28.0	9.0	0.16	0.49102
20.0	.8543679	3181	.4963246	3911	.2153422	3864	147 39 21.7	2.7	0.09	0.48645
20.5	.8587952	7459	.4896663	7335	.2124530	4973	148 7 75.7	56.7	+0.02	0.48186
21.0	.8631612	1125	.4829734	0412	.2095488	5932	148 36 70.1	51.0	—0.05	0.47725
21.5	.8674657	4175	.4762462	3147	.2066297	6742	149 5 64.8	45.7	0.11	0.47262
22.0	.8717084	6698	.4694852	5543	.2036960	7405	149 34 59.9	40.7	0.17	0.46796
22.5	.8758890	8419	.4626908	7606	.2007477	7922	150 3 55.3	36.1	0.23	0.46128
23.0	.8800073	9608	.4558634	9338	.1977852	8297	150 32 51.1	31.9	0.28	0.45588
23.5	.8840629	0170	.4490033	0744	.1948085	8531	151 1 47.4	28.1	0.33	0.45037
24.0	.8880557	0104	.4421109	1826	.1918179	8625	151 30 44.1	24.7	0.37	0.44494
24.5	.8919852	9405	.4351867	2591	.1888136	8583	151 59 41.2	21.8	0.41	0.44439
25.0	.8958512	8071	.4282312	3042	.1857957	8404	152 28 38.7	19.3	0.44	0.43961
25.5	.8996533	6098	.4212449	3185	.1827645	8093	152 57 36.7	17.2	0.46	0.43481
26.0	.9033912	3483	.4142282	3024	.1797201	7649	153 26 35.1	15.5	0.47	0.42999
26.5	.9070645	0222	.4071816	2564	.1766628	7077	153 55 34.0	14.3	0.47	0.42515
27.0	.9106730	6313	.4001056	1810	.1735927	6375	154 24 33.3	13.6	0.46	0.42029
27.5	.9142164	1753	.3930005	0765	.1705101	5549	154 53 33.1	13.4	0.46	0.41540
28.0	.9176943	6539	.3858669	9435	.1674152	4600	155 22 33.3	13.6	0.45	0.41049
28.5	.9211065	0667	.3787052	7824	.1643081	3530	155 51 34.1	14.3	0.42	0.40555
29.0	.9244526	4135	.3715160	5938	.1611892	2341	156 20 35.4	15.5	0.39	0.40058
29.5	.9277324	6940	.3642997	3781	.1580585	1035	156 49 37.1	17.2	0.35	0.39558
30.0	.9309455	9078	.3570568	1357	.1549162	9612	157 18 39.2	19.3	0.31	0.39054
30.5	.9340917	0546	.3497878	8674	.1517626	8077	157 47 41.9	21.9	0.26	0.38547
31.0	.9371706	1342	.3424933	5734	.1485980	6439	158 16 45.0	25.0	0.21	0.38037
31.5	.9401819	1462	.3351739	2546	.1454225	4675	158 45 48.6	28.5	0.16	0.37524
Sept. 1.0	.9431253	0903	.3278299	9111	.1422364	2814	159 14 52.7	32.5	0.10	0.37007
1.5	—9460006	9663	+3204629	5438	+1390399	0850	159 43 57.3	37.0	—0.04	0.36486

# SUN'S COÖRDINATES, 1869. 397

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .
Sept. 2.0	-.9488074	7738	+3130706	1529	+1358333	8784	160° 12' 62.3	42.0	+0.02	0.0
2.5	.9515455	5126	.3056563	7391	.1326168	6619	160 41 67.8	47.5	0.09	035433
3.0	.9542147	1826	.2982196	3029	.1293906	4357	161 10 73.8	53.4	0.14	034901
3.5	.9568147	7833	.2907611	8450	.1261549	2000	161 39 80.3	59.8	0.21	034364
4.0	.9593453	3146	.2832812	3656	.1229100	9551	162 9 27.2	6.7	0.27	033824
4.5	.9618063	7763	.2757806	8655	.1196561	7011	162 38 34.6	14.1	0.33	033279
5.0	.9641975	1683	.2682599	3453	.1163934	4384	163 7 42.5	22.0	0.39	032731
5.5	.9665186	4901	.2607196	8055	.1131222	1672	163 36 50.9	30.3	0.44	032179
6.0	.9687694	7417	.2531602	2466	.1098427	8877	164 5 59.7	39.1	0.49	031623
6.5	.9709497	9228	.2455826	6695	.1065552	6002	164 34 69.1	48.3	0.53	031063
7.0	.9730592	0331	.2379872	40745	.1032599	3048	165 3 78.6	57.9	0.57	030499
7.5	.9750978	0724	.2303746	4624	.0999570	0019	165 33 28.7	7.9	0.60	029931
8.0	.9770653	0407	.2227455	8338	.0966469	6918	166 2 39.2	18.4	0.63	029360
8.5	.9789616	9378	.2151002	1891	.0933298	3746	166 31 50.1	29.3	0.64	028785
9.0	.9807865	7635	.2074395	5288	.0900060	0507	167 0 61.5	40.6	0.65	028206
9.5	.9825399	5177	.1997638	8536	.0866757	7204	167 29 73.3	52.3	0.64	027624
10.0	.9842216	2002	.1920739	1641	.0833393	3840	167 59 25.5	4.5	0.63	027039
10.5	.9858315	8109	.1843703	4609	.0799968	0415	168 28 38.1	17.1	0.62	026451
11.0	.9873695	3498	.1766537	7447	.0766487	6933	168 57 51.1	30.1	0.60	025860
11.5	.9888366	8167	.1689246	10160	.0732951	3397	169 26 64.5	43.4	0.57	025266
12.0	.9902296	2115	.1611834	2752	.0699363	9808	169 55 78.3	57.1	0.53	024670
12.5	.9915514	5341	.1534308	5230	.0665725	6169	170 25 32.5	11.2	0.49	024072
13.0	.9928010	7846	.1456675	7601	.0632039	2482	170 54 47.1	25.8	0.44	023472
13.5	.9939783	9627	.1378940	9870	.0598308	8751	171 23 62.1	40.8	0.38	022870
14.0	.9950832	0685	.1301107	2041	.0564535	4977	171 52 77.6	56.2	0.32	022266
14.5	.9961157	1019	.1223183	4121	.0530722	1164	172 22 33.5	12.0	0.26	021661
15.0	.9970757	0628	.1145173	6114	.0496873	7314	172 51 49.7	28.2	0.19	021055
15.5	.9979630	9510	.1067084	8029	.0462988	3429	173 20 66.4	44.8	0.13	020448
16.0	.9987777	7665	.0988921	9869	.0429071	9511	173 50 23.4	1.8	+0.06	019840
16.5	.9995198	5095	.0910690	1641	.0395125	5563	174 19 40.9	19.3	0.00	019231
17.0	1.0001892	1798	.0832395	3349	.0361151	1588	174 48 58.8	37.2	-0.07	018621
17.5	1.0007859	7774	.0754043	5000	.0327152	7589	175 17 77.2	55.6	0.14	018011
18.0	1.0013098	3021	.0675637	6598	.0293131	3567	175 47 36.0	14.4	0.20	017401
18.5	1.0017609	7541	.0597184	8148	.0259090	9525	176 16 55.3	33.6	0.26	016791
19.0	1.0021390	1331	.0518690	9657	.0225030	5464	176 45 75.0	53.2	0.31	016181
19.5	1.0024442	4391	.0440158	1128	.0190954	0388	177 15 35.1	13.3	0.36	015571
20.0	1.0026764	6722	.0361595	2568	.0156864	7297	177 44 55.8	33.9	0.41	014961
20.5	1.0028356	8323	.0283005	3981	.0122763	3194	178 13 77.0	55.1	0.45	014351
21.0	1.0029217	9193	.0204394	5372	.0088654	9084	178 43 38.7	16.8	0.48	013741
21.5	1.0029347	9332	.0125768	6749	.0054538	4968	179 12 60.9	38.9	0.50	013132
22.0	1.0028746	8740	+0.047131	8114	+0.020419	0848	179 42 23.6	1.5	0.52	012523
22.5	1.0027413	7416	-0.031510	0524	-0.013702	3274	180 11 46.8	24.7	0.53	011914
23.0	1.0025347	5360	-0.110152	9164	-0.047822	7395	180 40 70.6	48.4	0.53	011306
23.5	1.0022548	2570	-0.188787	7796	-0.081939	1512	181 10 34.9	12.7	0.52	010698
24.0	1.0019017	9048	-0.267411	6418	-0.116051	5625	181 39 59.7	37.5	0.51	010090
24.5	1.0014753	4793	-0.346018	5023	-0.150155	9731	182 9 25.1	2.8	0.49	009482
25.0	1.0009756	9806	-0.424603	3606	-0.184249	3826	182 38 51.0	28.7	0.46	008875
25.5	1.0004026	4085	-0.503160	2161	-0.218331	7909	183 7 77.5	55.1	0.42	008267
26.0	.9997522	7631	-0.581684	0683	-0.252398	1977	183 37 44.6	22.1	0.37	007660
26.5	.9990364	0442	-0.660169	9166	-0.286449	6029	184 6 72.3	49.8	0.33	007052
27.0	.9982432	2520	-0.738609	7603	-0.320479	0060	184 36 40.5	18.0	0.28	006444
27.5	.9973765	3862	-0.816998	5990	-0.354487	4069	185 5 69.3	46.8	0.22	005836
28.0	.9964362	4469	-0.895331	4321	-0.388470	8053	185 35 38.7	16.1	0.16	005227
28.5	.9954252	4339	-0.973601	2589	-0.422426	2011	186 4 68.6	46.0	0.10	004618
29.0	.9943349	3475	-1.051803	0790	-0.456352	5938	186 34 39.1	16.5	-0.04	004007
29.5	.9931739	1874	-1.129931	8916	-0.490246	9833	187 3 70.2	47.5	+0.03	003396
30.0	.9919394	9539	-1.207978	6962	-0.524105	3693	187 33 41.9	19.1	0.10	002783
30.5	.9906314	6469	-1.285939	4921	-0.557927	7516	188 2 74.2	51.3	0.16	002169
Oct. 1.0	.9892500	2665	-1.363808	2789	-0.591709	1300	188 32 47.0	24.1	0.22	001554
1.5	.9877952	8126	-1.441579	0559	-0.625450	5042	189 1 80.4	57.5	0.28	000938
2.0	-.9862669	2853	-1.519245	8224	-0.659145	8739	189 31 54.4	31.5	+0.33	000321

# 398 SUN'S COORDINATES, 1869.

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.				
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .	
Oct. 2.5	—9846653	6849	—1596801	5779	—0692792	2388	190° 1' 29.0	6.0	+0.38	999702	
3.0	9829904	0108	1674240	3217	0726388	5986	190 30 64.1	41.0	0.43	999082	
3.5	9812424	2637	1751556	0532	0759932	9531	191 0 39.7	16.6	0.47	998460	
4.0	9794213	4436	1828742	7717	0793420	3021	191 20 75.9	52.7	0.51	997837	
4.5	9775272	5505	1905793	4767	0826850	6453	191 59 62.6	29.3	0.54	997212	
5.0	9755603	5846	1982702	1676	0860218	9823	192 29 29.8	6.5	0.56	996586	
5.5	9735207	5459	2059464	8437	0893522	3128	192 58 67.5	44.2	0.58	995958	
6.0	9714086	4348	2136072	5045	0926759	6367	193 28 45.8	22.4	0.59	995329	
6.5	9692239	2511	2212520	1493	0959928	9539	193 58 24.6	1.2	0.59	994699	
7.0	9669669	9952	2288801	7773	0993025	2638	194 27 63.8	40.4	0.59	994068	
7.5	9646378	6671	2364910	3882	1026047	5662	194 57 43.5	20.1	0.57	993435	
8.0	9622367	2670	2440840	9812	1058991	8608	195 27 23.7	0.3	0.55	992802	
8.5	9597638	7951	2516585	5557	1091856	1475	195 56 64.4	40.9	0.52	992167	
9.0	9572192	2515	2592140	1112	1124640	4261	196 26 45.5	22.0	0.49	991533	
9.5	9546032	6365	2667498	6470	1157339	6962	196 56 27.1	3.6	0.45	990897	
10.0	9519160	9503	2742653	1626	1189950	9575	197 25 69.1	45.6	0.40	990261	
10.5	9491578	1931	2817600	6573	1222471	2099	197 55 51.6	98.0	0.35	989624	
11.0	9463288	3651	2892333	1307	1254898	4529	198 25 34.5	10.8	0.29	988988	
11.5	9434293	4666	2966846	5820	1287231	6864	198 54 77.9	54.1	0.23	988351	
12.0	9404595	4978	3041135	0110	1319466	9101	199 24 61.7	37.9	0.16	987715	
12.5	9374196	4589	3115194	4169	1351602	1239	199 54 46.0	22.2	0.10	987079	
13.0	9343699	3502	3189017	7993	1383636	3276	200 24 30.7	6.7	+0.03	986445	
13.5	9311366	1719	3262599	1575	1415565	5207	200 53 75.9	52.0	—0.04	985811	
14.0	9278819	9242	3335935	4912	1447387	7031	201 23 61.5	37.5	0.10	985180	
14.5	9245641	6074	3409020	7998	1479100	8746	201 53 47.5	23.4	0.17	984549	
15.0	9211775	2219	3481848	0827	1510702	0352	202 23 33.9	9.8	0.23	983921	
15.5	9177223	7677	3554413	3393	1542189	1841	202 52 80.8	56.7	0.29	983294	
16.0	9141988	2452	3626710	5690	1573560	3215	203 22 68.2	44.0	0.35	982669	
16.5	9106073	6547	3698734	7715	1604812	4469	203 52 56.1	31.8	0.40	982046	
17.0	9069480	9964	3770479	9461	1635942	5602	204 22 44.4	20.1	0.45	981426	
17.5	9032211	2705	3841941	0924	1666949	6611	204 52 33.1	8.8	0.49	980808	
18.0	8994269	4773	3913114	2099	1697831	7496	205 21 82.2	57.9	0.52	980193	
18.5	8955657	6171	3983994	2880	1728586	8253	205 51 71.8	47.4	0.55	979580	
19.0	8916378	6903	4054576	3564	1759211	8881	206 21 62.0	37.5	0.57	978970	
19.5	8876433	6868	4124855	3844	1789703	9376	206 51 52.7	28.1	0.58	978363	
20.0	8835825	6370	4194825	3816	1820061	9737	207 21 43.8	19.2	0.59	977759	
20.5	8794557	5112	4264482	3475	1850284	9962	207 51 35.4	10.8	0.59	977158	
21.0	8752631	3196	4333821	2816	1880368	0649	208 21 27.5	2.8	0.58	976560	
21.5	8710056	1625	4402836	1833	1910312	9995	208 50 80.1	55.4	0.56	975965	
22.0	8666817	7462	4471524	0523	1940113	9799	209 20 73.3	48.5	0.53	975373	
22.5	8622934	3529	4539879	8880	1969769	9458	209 50 67.0	42.1	0.50	974784	
23.0	8578403	9009	4607897	6901	1999277	8969	210 20 61.2	36.3	0.47	974198	
23.5	8533228	3845	4675572	4578	2028636	8331	210 50 56.1	31.0	0.42	973615	
24.0	8487412	8038	4742898	1907	2057845	7544	211 20 51.3	26.3	0.38	973035	
24.5	8440957	1594	4809870	8881	2086899	6601	211 50 47.1	22.1	0.33	972458	
25.0	8393865	4512	4876484	5498	2115797	5502	212 20 43.5	18.4	0.27	971884	
25.5	8346139	6796	4942732	1749	2144537	4245	212 50 40.4	15.3	0.21	971312	
26.0	8297782	8449	5008611	7631	2173116	2827	213 20 37.9	12.7	0.14	970743	
26.5	8248797	9474	5074115	3137	2201533	1247	213 50 35.9	10.7	0.08	970176	
27.0	8199187	5874	5139239	8264	2229785	9503	214 20 34.5	9.2	—0.01	969611	
27.5	8148955	9652	5203678	3066	2257870	7591	214 50 33.7	8.3	+0.06	969049	
28.0	8098105	8812	5268327	7358	2285785	5509	215 20 33.4	8.0	0.12	968489	
28.5	8046640	7357	5332279	1313	2313529	3257	215 50 33.7	8.2	0.18	967931	
29.0	7994564	5391	5395831	4869	2341099	0830	216 20 34.5	9.0	0.24	967374	
29.5	7941880	2617	5458977	8018	2368493	8227	216 50 35.8	10.3	0.30	966819	
30.0	7888591	9338	5521710	0755	2395709	5446	217 20 37.7	12.1	0.35	966266	
30.5	7834701	5458	5584626	3075	2422745	2485	217 50 40.0	14.4	0.39	965715	
31.0	7780213	6980	5645921	4974	2449597	9341	218 20 42.9	17.2	0.43	965166	
31.5	7725131	5908	5707389	6446	2476265	6012	218 50 46.3	20.6	0.46	964617	
Nov. 1.0	7669459	6246	5768423	7484	2502745	2495	219 20 50.3	24.5	0.48	964070	
1.5	—7613201	3918	—5829019	8084	—2529036	8789	219 50 54.8	28.9	+0.50	963524	



# SUN'S COÖRDINATES, 1869. 399

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. = $\rho$ .
Nov. 2.0	—7556360	7168	—5889172	8241	—2555134	4891	220° 20' 59.7	33.8	+0.51	9.9 962980
2.5	7498941	9759	5948877	7950	2581038	0799	220 50 65.1	39.1	0.51	962436
3.0	7440950	1778	6008130	7207	2606746	6511	221 20 71.0	44.9	0.51	961894
3.5	7382391	3229	6066924	6005	2632255	2023	221 50 77.4	51.2	0.50	961353
4.0	7323268	4116	6125254	4340	2657564	7336	222 20 84.2	58.0	0.48	960813
4.5	7263585	4443	6183115	2205	2682669	2444	222 51 31.5	5.2	0.45	960275
5.0	7203347	4215	6240503	19598	2707570	7349	223 21 39.2	12.9	0.42	959739
5.5	7142559	3437	6297413	6512	2732264	2046	223 51 47.3	21.0	0.38	959204
6.0	7081226	2114	6353838	2942	2756748	6534	224 21 55.8	29.4	0.34	958670
6.5	7019353	10251	6409777	8885	2781021	0810	224 51 64.7	38.2	0.29	958138
7.0	6956946	7854	6465223	4336	2805081	4874	225 21 74.0	47.4	0.23	957608
7.5	6894009	4927	6520173	19291	2828926	8723	225 51 83.7	57.1	0.17	957080
8.0	6830546	1474	6574623	3746	2852553	2355	226 22 33.8	7.2	0.11	956554
8.5	6766563	7501	6628568	7695	2875962	5767	226 52 44.3	17.6	+0.05	956030
9.0	6702066	3014	6682005	1137	2899150	8959	227 22 55.1	28.3	—0.02	955509
9.5	6637060	8018	6734928	4065	2922116	1929	227 52 66.2	39.4	0.09	954990
10.0	6571548	2516	6787335	6477	2944857	4674	228 22 77.7	50.8	0.16	954474
10.5	6505536	6514	6839220	8367	2967372	7193	228 53 29.5	2.5	0.23	953962
11.0	6439029	10017	6890579	19732	2989659	9484	229 23 41.7	14.6	0.29	953453
11.5	6372034	3032	6941409	0567	3011716	1545	229 53 54.2	27.0	0.35	952946
12.0	6304555	5563	6991707	0871	3033541	3374	230 23 67.1	39.8	0.41	952444
12.5	6236598	7616	7041469	0638	3055134	4971	230 53 80.3	53.0	0.47	951945
13.0	6168168	9196	7090691	19866	3076492	6334	231 25 33.9	6.5	0.52	951450
13.5	6099271	10309	7139370	8551	3097614	7460	231 55 47.8	20.4	0.56	950960
14.0	6029912	10959	7187503	6690	3118499	8349	232 24 62.0	34.5	0.60	950474
14.5	5960096	1153	7235086	4279	3139144	8999	232 54 76.5	48.9	0.63	949993
15.0	5889828	10895	7282115	1314	3159549	9409	233 25 31.4	3.7	0.66	949517
15.5	5819113	10190	7328586	7791	3179712	9576	233 55 46.6	18.8	0.68	949046
16.0	5747956	9042	7374497	3709	3199631	9499	234 25 62.2	34.3	0.69	948580
16.5	5676361	7457	7419844	9062	3219305	9177	234 55 78.1	50.2	0.69	948119
17.0	5604333	5438	7464624	3849	3238734	8611	235 26 34.3	6.4	0.68	947663
17.5	5531878	2992	7508834	8066	3257915	7796	235 56 50.9	22.9	0.67	947211
18.0	5459002	10125	7552471	1710	3276847	6732	236 26 67.8	39.7	0.65	946765
18.5	5385709	6841	7595531	4777	3295529	5418	236 56 85.1	57.0	0.62	946325
19.0	5312005	3146	7638012	7265	3313959	3853	237 27 42.8	14.6	0.58	945891
19.5	5237895	9045	7679910	9170	3332136	2034	237 57 60.9	32.6	0.54	945463
20.0	5163383	4542	7721222	0489	3350058	1961	238 27 79.4	51.0	0.50	945039
20.5	5088476	9644	7761945	1219	3367724	7631	238 58 38.3	9.8	0.45	944621
21.0	5013178	4355	7802075	1357	3385133	5045	239 28 57.5	29.0	0.39	944209
21.5	4937495	8681	7841608	0898	3402282	2199	239 58 77.1	48.5	0.33	943802
22.0	4861430	2625	7880543	19841	3419171	9093	240 29 37.1	8.4	0.27	943401
22.5	4784991	6195	7918876	8182	3435798	5724	240 59 57.5	28.8	0.20	943005
23.0	4708182	9395	7956601	5915	3452162	2093	241 29 78.3	49.5	0.13	942614
23.5	4631009	2231	7993718	3039	3468262	8197	242 0 39.5	10.6	—0.06	942228
24.0	4553477	4708	8030223	19552	3484097	4037	242 30 61.1	32.1	0.00	941848
24.5	4475592	6832	8066112	5449	3499665	9609	243 0 83.1	54.0	+0.07	941473
25.0	4397359	8608	8101382	0727	3514964	4913	243 31 45.4	16.2	0.13	941102
25.5	4318785	10043	8136030	5383	3529993	9947	244 1 68.2	38.9	0.19	940736
26.0	4239875	1141	8170053	19415	3544752	4711	244 32 31.3	2.0	0.24	940375
26.5	4160633	1908	8203448	2818	3559238	9202	245 2 54.9	25.5	0.29	940018
27.0	4081066	2349	8236210	5589	3573450	3419	245 32 78.8	49.3	0.33	939666
27.5	4001179	2471	8268337	7724	3587387	7361	246 3 43.2	13.6	0.36	939317
28.0	3920980	2280	8299827	9223	3601048	1027	246 33 67.9	38.3	0.39	938973
28.5	3840473	1782	8330676	0081	3614431	4415	247 4 33.0	3.3	0.41	938632
29.0	3759666	10983	8360881	0295	3627535	7524	247 34 58.4	28.6	0.42	938295
29.5	3678564	9889	8390440	19863	3640358	0352	248 4 84.2	54.3	0.43	937961
30.0	3597175	8508	8419349	8781	3652900	2899	248 35 50.3	20.3	0.43	937631
30.5	3515504	6845	8447605	7046	3665160	5165	249 5 76.7	46.6	0.42	937305
Dec. 1.0	3433560	4909	8475206	4656	3677137	7147	249 36 43.4	13.2	0.40	936983
1.5	3351347	2704	8502149	1608	3688828	8843	250 6 70.5	40.2	0.38	936664
2.0	3268872	10237	8528432	7901	3700233	0253	250 37 37.9	7.6	+0.36	936349

# 400 SUN'S COÖRDINATES, 1869.

Date, 1869.	RECTANGULAR EQUATORIAL.						POLAR ECLIPTIC.			
	X.	X'.	Y.	Y'.	Z.	Z'.	$\lambda = \odot$ 's True Longitude.	$\lambda'$	$\delta = \odot$ 's Latitude.	Log. Rad. Vect. - p.
Dec. 2.5	-3186142	7515	-8554053	3531	-3711351	1376	251° 7' 65.6	35.2	+0.32	936037
3.0	-3103164	4545	-8579009	8497	-3722180	2210	251 38 33.5	3.1	0.28	935729
3.5	-3019944	1333	-8603298	2796	-3732720	2755	252 8 61.7	31.2	0.24	935424
4.0	-2936489	7885	-8626914	6422	-3742970	3011	252 38 90.1	59.5	0.19	935122
4.5	-2852806	4210	-8649861	9379	-3752929	2975	253 9 58.7	28.0	0.13	934823
5.0	-2768903	3014	-8672135	1663	-3762597	2648	253 39 87.6	56.8	0.07	934528
5.5	-2684786	6204	-8693734	3272	-3771972	2028	254 10 56.7	25.8	+0.01	934237
6.0	-2600464	1889	-8714657	4205	-3781054	1116	254 40 86.0	55.0	-0.06	933950
6.5	-2515942	7374	-8734901	4459	-3789842	9909	255 11 55.5	24.4	0.13	933666
7.0	-2431227	2666	-8754465	4034	-3798334	8406	255 41 85.2	54.1	0.20	933386
7.5	-2346325	7771	-8773348	1927	-3806530	6607	256 12 55.0	23.9	0.27	933110
8.0	-2261244	2697	-8791548	1138	-3814430	4513	256 42 85.0	53.8	0.33	932838
8.5	-2175992	7452	-8809064	8665	-3822032	2120	257 13 55.1	23.8	0.39	932571
9.0	-2090575	2042	-8825895	5507	-3829338	9432	257 43 85.4	54.0	0.45	932308
9.5	-2004998	6472	-8842040	1663	-3836346	6445	258 14 55.8	24.3	0.51	932049
10.0	-1919269	30749	-8857498	7132	-3843055	3160	258 44 86.4	54.8	0.56	931796
10.5	-1833394	4880	-8872269	1914	-3849466	9576	259 15 57.1	25.4	0.60	931548
11.0	-1747381	8873	-8886351	6007	-3855578	5693	259 45 87.9	56.1	0.64	931305
11.5	-1661237	2735	-8899743	9410	-3861399	1510	260 16 58.9	27.0	0.67	931067
12.0	-1574969	6473	-8912444	2123	-3866902	7028	260 46 89.9	58.0	0.70	930836
12.5	-1488582	30092	-8924454	4144	-3872114	2245	261 17 61.0	29.0	0.72	930610
13.0	-1402083	3599	-8935774	5476	-3877026	7163	261 48 32.3	0.2	0.73	930390
13.5	-1315478	5999	-8946402	6116	-3881637	1779	262 18 63.7	31.5	0.73	930176
14.0	-1228775	30302	-8956336	6062	-3885947	6095	262 49 35.2	2.9	0.73	929968
14.5	-1141982	3515	-8965576	5314	-3889956	30109	263 19 66.8	34.4	0.71	929766
15.0	-1055104	6642	-8974122	3872	-3893663	3822	263 50 38.5	6.0	0.69	929571
15.5	-968146	9689	-8981974	1736	-3897069	7233	264 20 70.3	37.7	0.67	929382
16.0	-881115	2663	-8989131	8905	-3900173	3043	264 51 42.2	9.5	0.64	929200
16.5	-794017	5570	-8995593	5379	-3902975	3150	265 21 74.2	41.5	0.60	929026
17.0	-706860	8418	-9001359	1158	-3905475	5656	265 52 46.4	13.6	0.55	928859
17.5	-619648	1211	-9006430	6241	-3907673	7859	266 22 78.7	45.9	0.50	928698
18.0	-532388	3955	-9010805	6629	-3909569	9761	266 53 51.1	18.2	0.45	928545
18.5	-445086	6658	-9014484	4320	-3911163	1360	267 23 83.6	50.6	0.39	928398
19.0	-357750	9326	-9017466	7315	-3912454	2657	267 54 56.3	23.2	0.33	928258
19.5	-270384	1965	-9019751	9613	-3913442	3650	268 24 89.1	55.9	0.26	928125
20.0	-182997	4582	-9021339	1214	-3914128	4342	268 55 62.1	28.8	0.19	927999
20.5	-905594	7184	-9022229	2117	-3914511	4730	269 26 35.2	1.8	0.12	927880
21.0	-0008182	9776	-9022421	2322	-3914590	4815	269 56 68.4	35.0	-0.05	927768
21.5	+0079233	7635	-9021915	1829	-3914366	4596	270 27 41.8	8.3	+0.01	927663
22.0	-0166645	5043	-9020710	6637	-3913839	4075	270 57 75.3	41.7	0.07	927564
22.5	-0254047	2441	-9018806	8746	-3913009	3250	271 28 48.9	15.2	0.13	927472
23.0	-0341432	9822	-9016202	6156	-3911876	2123	271 58 82.7	48.9	0.18	927387
23.5	-0428795	7181	-9012898	2865	-3910439	9691	272 29 56.6	22.7	0.23	927308
24.0	-0516127	4510	-9008895	8876	-3908699	8957	272 59 90.7	56.7	0.28	927235
24.5	-0603424	1803	-9004191	4185	-3906656	6919	273 30 64.9	30.8	0.32	927168
25.0	-0690676	9052	-8998787	8795	-3904310	4579	274 1 39.3	5.1	0.36	927107
25.5	-0777880	6252	-8992683	2705	-3901661	1935	274 31 73.8	39.5	0.38	927052
26.0	-0865028	3397	-8985878	5914	-3898708	8988	275 2 48.4	14.0	0.40	927002
26.5	-0952113	9479	-8978373	8423	-3895451	5736	275 32 83.2	48.7	0.41	926958
27.0	-1039129	7492	-8970168	9232	-3891891	2182	276 3 58.1	23.6	0.41	926919
27.5	-1126067	4427	-8961262	1340	-3888028	8324	276 33 93.1	58.5	0.41	926885
28.0	-1212922	1279	-8951657	1749	-3883861	4163	277 4 68.2	33.5	0.40	926856
28.5	-1299684	8038	-8941352	1458	-3879391	9698	277 35 43.4	8.6	0.38	926832
29.0	-1386349	4701	-8930348	9468	-3874618	4931	278 5 78.7	43.8	0.36	926812
29.5	-1472908	1258	-8918646	8780	-3869542	9861	278 36 54.1	19.1	0.33	926797
30.0	-1559355	7703	-8906246	6395	-3864165	4490	279 6 89.6	54.5	0.30	926787
30.5	-1645682	4028	-8893150	3313	-3858485	8815	279 37 65.1	29.9	0.25	926781
31.0	-1731883	9227	-8879359	9537	-3852504	2840	280 8 40.6	5.4	0.20	926779
31.5	-1817949	6291	-8864874	5066	-3846223	6566	280 38 76.2	40.9	0.15	926781
32.0	+1903875	2216	-8849697	9904	-3839642	9990	281 9 51.7	16.3	+0.09	926788

# HELIOCENTRIC COORDINATES. 401

MERCURY.										
1869.	Days from Epoch.	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .	
Jan.	2	3695	-0.0253	-0.4620	-0.0367	9.6667	267° 4.6	+0.25	+4.50	+0.36
	7	3700	+0.0869	0.4441	0.0452	9.6578	281 15.4	-0.90	4.60	0.47
	12	3705	0.1925	0.3914	0.0502	9.6423	296 15.5	2.21	4.51	0.58
	17	3710	0.2801	0.3048	0.0507	9.6201	312 37.2	3.76	4.09	0.68
	22	3715	0.3396	0.1872	0.0461	9.5916	331 12	5.55	3.06	0.75
Feb.	27	3720	0.3568	-0.0472	0.0358	9.5583	352 15.5	7.34	+0.97	0.74
	1	3725	0.3187	+0.0992	0.0201	9.5243	17 6.8	8.29	-2.58	0.52
	6	3730	0.2193	0.2254	-0.0006	9.4975	45 47.9	6.86	7.05	+0.02
	11	3735	+0.0696	0.2989	+0.0190	9.4879	77 5.1	-2.33	10.00	-0.64
	16	3740	-0.0972	0.2989	0.0339	9.5000	108 11.6	+3.00	9.21	1.04
March	21	3745	0.2428	0.2305	0.0411	9.5280	136 28.0	6.15	5.85	1.04
	26	3750	0.3432	+0.1179	0.0406	9.5623	160 52.7	6.86	-2.36	0.81
	31	3755	0.3920	-0.0135	0.0339	9.5952	181 45.0	6.26	+0.22	0.54
	1	3760	0.3938	0.1436	0.0231	9.6230	199 52.6	5.18	1.89	0.30
	6	3765	0.3562	0.2598	+0.0100	9.6444	216 3.2	4.04	2.95	-0.11
April	13	3770	0.2877	0.3540	-0.0042	9.6592	230 56.0	2.95	3.63	+0.05
	18	3775	0.1969	0.4207	0.0179	9.6673	245 3.0	1.91	4.08	0.18
	23	3780	-0.0914	0.4564	0.0303	9.6688	258 51.3	+0.88	4.38	0.29
	28	3785	+0.0205	0.4589	0.0406	9.6639	272 46.2	-0.20	4.55	0.40
	1	3790	0.1308	0.4270	0.0477	9.6523	287 13.4	1.41	4.59	0.51
	7	3795	0.2303	0.3604	0.0509	9.6341	302 42.2	2.81	4.39	0.62
	12	3800	0.3085	0.2604	0.0495	9.6093	319 48.3	4.46	3.77	0.72
	17	3805	0.3524	-0.1323	0.0426	9.5785	339 15.3	6.31	+2.37	0.76
	22	3810	0.3486	+0.0127	0.0300	9.5442	1 53.0	7.90	-0.28	0.68
	27	3815	0.2856	0.1548	-0.0125	9.5120	28 19.8	8.09	4.39	+0.36
May	2	3820	0.1630	0.2633	+0.0076	9.4911	58 19.6	5.33	8.62	-0.25
	7	3825	+0.0015	0.3081	0.0258	9.4903	89 55.1	-0.05	10.14	0.85
	12	3830	-0.1608	0.2783	0.0379	9.5100	120 7.1	+4.61	8.00	1.09
	17	3835	0.2896	0.1884	0.0418	9.5417	146 51.0	6.68	4.35	0.96
	22	3840	0.3691	+0.0654	0.0385	9.5761	169 44.5	6.72	-1.19	0.70
June	27	3845	0.3980	-0.0673	0.0299	9.6072	189 23.8	5.84	+0.99	0.44
	1	3850	0.3826	0.1933	0.0179	9.6325	206 38.5	4.72	2.37	0.23
	6	3855	0.3315	0.3012	+0.0042	9.6512	222 13.2	3.59	3.26	-0.04
	11	3860	0.2529	0.3847	-0.0099	9.6632	236 43.8	2.52	3.83	+0.09
	16	3865	0.1552	0.4390	0.0232	9.6687	250 40.2	1.49	4.22	0.22
July	21	3870	-0.0466	0.4615	0.0348	9.6676	264 28.2	+0.45	4.46	0.33
	26	3875	+0.0658	0.4502	0.0438	9.6600	278 32.9	-0.67	4.59	0.44
	31	3880	0.1732	0.4039	0.0495	9.6457	293 21.3	1.95	4.55	0.56
	1	3885	0.2654	0.3234	0.0510	9.6247	309 24.9	3.45	4.21	0.66
	6	3890	0.3312	0.2113	0.0474	9.5974	327 22.5	5.20	3.32	0.74
Aug.	11	3895	0.3574	-0.0746	0.0382	9.5648	348 1.0	7.03	+1.47	0.75
	16	3900	0.3306	+0.0723	0.0234	9.5305	12 8.8	8.25	-1.80	0.58
	21	3905	0.2422	0.2050	-0.0044	9.5015	40 9.2	7.38	6.24	+0.13
	26	3910	+0.1002	0.2905	+0.0155	9.4880	71 7.7	-3.51	9.71	-0.50
	31	3915	-0.0665	0.3046	0.0316	9.4961	102 30.4	+2.10	9.63	1.00
	10	3920	0.2183	0.2477	0.0404	9.5220	131 26.8	5.78	6.54	1.07
	15	3925	0.3282	0.1410	0.0412	9.5558	156 35.2	6.87	2.96	0.87
	20	3930	0.3867	+0.0115	0.0355	9.5893	178 4.0	6.42	-0.19	0.59
	25	3935	0.3966	-0.1202	0.0253	9.6182	196 38.7	5.40	+1.63	0.35
	30	3940	0.3657	0.2396	+0.0124	9.6409	213 7.9	4.25	2.78	-0.14
Sept.	4	3945	0.3025	0.3384	-0.0015	9.6569	228 12.7	3.15	3.53	+0.02
	9	3950	-0.2152	-0.4106	-0.0154	9.6662	242 26.1	+2.10	+4.00	+0.15

NOTE.—The Epoch is the 2400,000th day of the Julian Period = 1858, November 16.

# 402 HELIOCENTRIC COORDINATES.

MERCURY.										
1869.	Days from Epoch.	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{r^2}{r^3}x$ .	$-\frac{r^2}{r^3}y$ .	$-\frac{r^2}{r^3}z$ .	
Sept.	14	3955	-0.1120	-0.4522	-0.0281	9.6690	256° 16.0	+1.07	+4.33	+0.27
	19	3960	-0.0007	0.4611	0.0388	9.6653	270 7.7	+0.01	4.53	0.38
	24	3965	+0.1108	0.4355	0.0466	9.6550	284 26.8	-1.17	4.60	0.49
	29	3970	0.2129	0.3754	0.0506	9.6380	299 41.5	2.53	4.46	0.60
	Oct. 4	3975	0.2960	0.2815	0.0502	9.6144	316 26.2	4.14	3.93	0.70
	9	3980	0.3474	0.1582	0.0444	9.5847	335 23.1	5.96	2.71	0.76
	14	3985	0.3536	-0.0150	0.0329	9.5508	357 21.2	7.66	+0.33	0.71
	19	3990	0.3022	+0.1296	-0.0160	9.5175	23 3.7	8.24	-3.54	+0.43
	24	3995	0.1900	0.2470	+0.0038	9.4937	52 29.0	6.11	7.94	-0.12
	29	4000	+0.0334	0.3055	0.0228	9.4887	83 59.9	-1.11	10.17	0.76
Nov.	3	4005	-0.1319	0.2892	0.0362	9.5050	114 40.2	+3.92	8.60	1.07
	8	4010	0.2690	0.2088	0.0416	9.5353	142 7.7	6.48	5.03	1.00
	13	4015	0.3582	+0.0897	0.0396	9.5698	165 42.7	6.81	-1.71	0.76
	18	4020	0.3962	-0.0427	0.0318	9.6017	185 54.7	6.04	+0.64	0.48
	23	4025	0.3885	0.1707	0.0203	9.6282	203 33.0	4.93	2.16	0.26
Dec.	28	4030	0.3435	0.2826	+0.0068	9.6482	219 23.5	3.80	3.13	-0.08
	3	4035	0.2695	0.3711	-0.0072	9.6615	234 3.8	2.72	3.74	+0.07
	8	4040	0.1748	0.4311	0.0207	9.6681	248 4.5	1.68	4.15	0.20
	13	4045	-0.0673	0.4598	0.0328	9.6683	261 52.2	+0.65	4.42	0.31
	18	4050	+0.0450	0.4549	0.0424	9.6619	275 51.8	-0.46	4.58	0.43
	23	4055	0.1540	0.4152	0.0488	9.6489	290 29.8	1.69	4.57	0.54
	28	4060	0.2498	0.3412	0.0511	9.6292	306 16.5	3.15	4.30	0.64
	33	4065	0.3214	0.2346	0.0484	9.6030	323 49.3	4.86	3.55	0.73
	38	4070	+0.3562	-0.1018	-0.0404	9.5712	343 53.6	-6.70	+1.91	+0.76
	VENUS.									
1869.	Days from Epoch	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{r^2}{r^3}x$ .	$-\frac{r^2}{r^3}y$ .	$-\frac{r^2}{r^3}z$ .	
Jan	2	3695	-0.6805	-0.2368	+0.0355	9.8583	199° 8.3	+21.96	+ 7.65	-1.15
	7	3700	0.6415	0.3301	0.0319	9.8587	207 10.9	20.66	10.64	1.03
	12	3705	0.5899	0.4170	0.0276	9.8591	215 12.6	18.95	13.40	0.89
	17	3710	0.5267	0.4956	0.0227	9.8595	223 13.3	16.88	15.89	0.73
	22	3715	0.4532	0.5647	0.0175	9.8599	231 13.2	14.48	18.04	0.56
Feb.	27	3720	0.3709	0.6227	0.0119	9.8603	239 12.1	11.82	19.85	0.38
	1	3725	0.2814	0.6688	0.0061	9.8607	247 10.2	8.94	21.25	-0.19
	6	3730	0.1865	0.7018	+0.0001	9.8610	255 07.5	5.91	22.25	0.00
	11	3735	-0.0879	0.7213	-0.0058	9.8613	263 04.0	+ 2.78	22.82	+0.18
	16	3740	+0.0123	0.7269	0.0116	9.8616	270 59.9	- 0.39	22.96	0.37
March	21	3745	0.1123	0.7186	0.0172	9.8619	278 55.2	3.54	22.65	0.54
	26	3750	0.2101	0.6966	0.0225	9.8620	286 50.0	6.61	21.93	0.71
	31	3755	0.3039	0.6611	0.0273	9.8622	294 44.5	9.56	20.79	0.86
	5	3760	0.3918	0.6129	0.0317	9.8623	302 38.7	12.32	19.26	1.00
	8	3765	0.4724	0.5531	0.0354	9.8623	310 32.9	14.85	17.38	1.11
April	13	3770	0.5438	0.4827	0.0385	9.8623	318 27.1	17.09	15.17	1.21
	18	3775	0.6049	0.4031	0.0407	9.8622	326 21.4	19.02	12.68	1.28
	23	3780	0.6544	0.3158	0.0423	9.8620	334 15.9	20.61	9.94	1.33
	28	3785	0.6914	0.2224	0.0430	9.8618	342 10.8	21.80	7.01	1.36
	2	3790	0.7151	0.1247	0.0429	9.8616	350 06.2	22.58	3.94	1.35
	7	3795	0.7250	-0.0246	0.0420	9.8613	358 02.2	22.94	+ 0.78	1.33
	12	3800	0.7210	+0.0759	0.0402	9.8610	5 58.9	22.86	- 2.41	1.27
	17	3805	0.7030	0.1750	0.0377	9.8606	13 56.3	22.36	5.56	1.20
	22	3810	+0.6715	+0.2706	-0.0344	9.8602	21 54.5	-21.43	- 8.63	+1.10

NOTE.—The Epoch is the 2400,000th day of the Julian Period = 1858, November 16.

# HELIOCENTRIC COORDINATES. 403

VENUS.									
1869.	Days from Epoch.	$x$ .	$y$ .	$z$ .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .
April 27	3815	+0.6270	+0.3611	-0.0306	9.8598	29° 53.6	-20.04	-11.54	+0.98
May 2	3820	0.5703	0.4444	0.0261	9.8594	37° 53.6	18.28	14.25	0.84
7	3825	0.5024	0.5192	0.0210	9.8590	45° 54.5	16.15	16.69	0.68
12	3830	0.4246	0.5837	0.0156	9.8586	53° 56.3	13.69	18.82	0.50
17	3835	0.3386	0.6369	0.0099	9.8582	61° 59.0	10.95	20.60	0.32
22	3840	0.2459	0.6775	-0.0040	9.8578	70° 2.6	7.98	21.97	+0.12
27	3845	0.1484	0.7048	+0.0020	9.8575	78° 6.9	4.82	22.90	-0.07
June 1	3850	+0.0480	0.7180	0.0080	9.8572	86° 12.0	- 1.56	23.38	0.26
6	3855	-0.0534	0.7172	0.0138	9.8569	94° 17.7	+ 1.74	23.40	0.45
11	3860	0.1537	0.7020	0.0193	9.8567	102° 24.0	5.02	22.93	0.63
16	3865	0.2511	0.6729	0.0245	9.8565	110° 30.7	8.21	22.01	0.80
21	3870	0.3434	0.6304	-0.0291	9.8564	118° 37.7	11.25	20.64	0.96
26	3875	0.4288	0.5754	0.0332	9.8564	126° 44.9	14.04	18.84	1.09
July 1	3880	0.5057	0.5088	0.0366	9.8564	134° 52.2	16.56	16.66	1.20
6	3885	0.5726	0.4323	0.0393	9.8564	142° 59.3	18.74	14.15	1.20
11	3890	0.6280	0.3471	0.0412	9.8566	151° 6.3	20.52	11.36	1.35
16	3895	0.6710	0.2549	0.0423	9.8567	159° 12.9	21.91	8.33	1.38
21	3900	0.7005	0.1576	0.0426	9.8570	167° 19.1	22.83	5.14	1.39
26	3905	0.7163	+0.0573	0.0420	9.8572	175° 24.7	23.31	- 1.87	1.37
31	3910	0.7178	-0.0442	0.0406	9.8576	183° 29.6	23.30	+ 1.43	1.31
Aug. 5	3915	0.7052	0.1448	0.0383	9.8579	191° 33.8	22.85	4.69	1.24
10	3920	0.6786	0.2425	0.0353	9.8583	199° 37.2	21.93	7.83	1.14
15	3925	0.6388	0.3355	0.0316	9.8587	207° 39.7	20.58	10.81	1.02
20	3930	0.5864	0.4220	0.0273	9.8591	215° 41.3	18.84	13.55	0.88
25	3935	0.5225	0.5001	0.0225	9.8595	223° 42.0	16.74	16.02	0.72
30	3940	0.4484	0.5685	0.0172	9.8599	231° 41.9	14.32	18.15	0.55
Sept. 4	3945	0.3657	0.6259	0.0116	9.8603	239° 40.8	11.65	19.94	0.37
9	3950	0.2758	0.6711	+0.0058	9.8607	247° 38.8	8.76	21.32	-0.18
14	3955	0.1806	0.7034	-0.0002	9.8610	255° 36.0	5.73	22.30	+0.01
19	3960	-0.0820	0.7221	0.0061	9.8614	263° 32.5	+ 2.59	22.85	0.20
24	3965	+0.0183	0.7269	0.0119	9.8616	271° 28.4	- 0.58	22.95	0.38
29	3970	0.1183	0.7177	0.0175	9.8619	279° 23.7	3.73	22.62	0.56
Oct. 4	3975	0.2159	0.6948	0.0228	9.8621	287° 18.5	6.79	21.86	0.72
9	3980	0.3095	0.6585	0.0276	9.8622	295° 12.9	9.72	20.71	0.87
14	3985	0.3970	0.6097	0.0319	9.8623	303° 07.2	12.47	19.16	1.00
19	3990	0.4769	0.5492	0.0356	9.8623	311° 1.4	14.99	17.26	1.11
24	3995	0.5478	0.4782	0.0386	9.8622	318° 55.5	17.23	15.04	1.21
29	4000	0.6082	0.3981	0.0408	9.8622	326° 49.9	19.12	12.51	1.29
Nov. 3	4005	0.6570	0.3103	0.0423	9.8620	334° 44.4	20.69	9.77	1.33
8	4010	0.6931	0.2166	0.0429	9.8618	342° 39.4	21.86	6.82	1.36
13	4015	0.7160	0.1187	0.0429	9.8616	350° 34.8	22.61	3.75	1.35
18	4020	0.7252	-0.0186	0.0419	9.8613	358° 30.8	22.95	+ 0.59	1.32
23	4025	0.7203	+0.0819	0.0401	9.8609	6° 27.5	22.86	- 2.60	1.27
28	4030	0.7016	0.1809	0.0376	9.8606	14° 25.0	22.30	5.76	1.19
Dec. 3	4035	0.6692	0.2763	0.0343	9.8602	22° 23.3	21.33	8.81	1.09
8	4040	0.6239	0.3663	0.0303	9.8598	30° 22.4	19.95	11.71	0.97
13	4045	0.5664	0.4493	0.0258	9.8594	38° 22.5	18.16	14.40	0.83
18	4050	0.4979	0.5235	0.0207	9.8590	46° 23.5	16.00	16.83	0.66
23	4055	0.4197	0.5874	0.0153	9.8586	54° 25.4	13.53	18.93	0.49
28	4060	+0.3333	+0.6399	-0.0096	9.8582	62° 28.1	-10.77	-20.68	+0.31

NOTE.—The Epoch is the 2400,000th day of the Julian Period = 1858, November 16.

# 404 HELIOCENTRIC COÖRDINATES.

THE EARTH.										
1869.	Days from Epoch.	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{\kappa^2}{r^3}x$ .	$-\frac{\kappa^2}{r^3}y$ .	$-\frac{\kappa^2}{r^3}z$ .	
		3690	-0.0361	+0.9827	0.0000	9.9927	92° 6.3	+ 0.52	-13.79	0.00
Jan.	2	3700	0.2094	0.9608		9.9927	102 17.6	2.93	13.48	
	12	3710	0.3762	0.9089		9.9928	112 29.1	5.27	12.74	
	22	3720	0.5313	0.8288		9.9932	122 30.7	7.43	11.59	
Feb.	1	3730	0.6701	0.7231		9.9936	132 49.0	9.33	10.07	
	11	3740	0.7882	0.5951		9.9946	142 56.6	10.92	8.24	
	21	3750	0.8821	0.4489		9.9955	153 1.7	12.14	6.18	
March	3	3760	0.9491	0.2890		9.9965	163 4.0	12.96	3.95	
	13	3770	0.9875	+0.1203		9.9977	173 3.2	13.38	- 1.63	
	23	3780	0.9963	-0.0520		9.9989	182 59.1	13.39	+ 0.70	
April	2	3790	0.9753	0.2227		0.0002	192 51.6	13.00	2.97	
	12	3800	0.9256	0.3869		0.0014	202 40.8	12.23	5.11	
	22	3810	0.8490	0.5398		0.0026	212 26.7	11.13	7.07	
May	2	3820	0.7477	0.6770		0.0037	222 9.4	9.73	8.80	
	12	3830	0.6248	0.7947		0.0047	231 49.3	8.07	10.26	
	22	3840	0.4841	0.8898		0.0056	241 26.7	6.21	11.42	
June	1	3850	0.3298	0.9596		0.0063	251 2.0	4.21	12.26	
	11	3860	-0.1661	1.0021		0.0068	260 35.8	+2.12	12.76	
	21	3870	+0.0024	1.0163		0.0071	270 8.5	-0.03	12.91	
July	1	3880	0.1708	1.0021		0.0072	279 40.6	2.17	12.72	
	11	3890	0.3344	0.9599		0.0071	289 12.6	4.25	12.19	
	21	3900	0.4886	0.8907		0.0068	298 45.0	6.22	11.34	
	31	3910	0.6291	0.7964		0.0064	308 18.5	8.03	10.17	
Aug.	10	3920	0.7518	0.6796		0.0057	317 53.5	9.64	8.71	
	20	3930	0.8531	0.5433		0.0049	327 30.5	11.00	7.01	
	30	3940	0.9301	0.3916		0.0039	337 9.9	12.08	5.09	
Sept.	9	3950	0.9802	0.2287		0.0028	346 52.1	12.83	2.99	
	19	3960	1.0019	-0.0591		0.0016	356 37.4	13.22	+0.78	
	29	3970	0.9945	+0.1122		0.0004	6 26.0	13.23	-1.49	
Oct.	9	3980	0.9579	0.2800		9.9991	16 17.9	12.86	3.76	
	19	3990	0.8928	0.4396		9.9979	26 13.1	12.09	5.95	
	29	4000	0.8010	0.5862		9.9967	36 11.7	10.93	8.00	
Nov.	8	4010	0.6850	0.7150		9.9957	46 13.5	9.41	9.83	
	18	4020	0.5481	0.8219		9.9947	56 18.2	7.58	11.37	
	28	4030	0.3945	0.9037		9.9939	66 25.3	5.49	12.57	
Dec.	8	4040	0.2287	0.9578		9.9933	76 34.4	3.20	13.38	
	18	4050	+0.0558	0.9823		9.9929	86 44.8	- 0.78	13.76	
	28	4060	-0.1188	+0.9761	0.0000	9.9927	96 56.1	+ 1.67	-13.70	0.00
MARS.										
1869.	Days from Epoch.	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{\kappa^2}{r^3}x$ .	$-\frac{\kappa^2}{r^3}y$ .	$-\frac{\kappa^2}{r^3}z$ .	
		3690	-0.8673	+1.3919	+0.0508	0.2151	121° 56.3	+0.35	-0.56	-0.02
Jan.	2	3700	0.9773	1.3250	0.0520	0.2168	126 25.1	0.39	0.52	0.02
	12	3710	1.0807	1.2492	0.0529	0.2182	130 52.0	0.42	0.49	0.02
	22	3720	1.1771	1.1653	0.0534	0.2194	135 17.4	0.46	0.45	0.02
Feb.	1	3730	1.2658	1.0739	0.0536	0.2203	139 41.4	0.49	0.41	0.02
	11	3740	1.3464	0.9755	0.0535	0.2210	144 4.4	0.52	0.37	0.02
	21	3750	1.4183	0.8708	0.0529	0.2214	148 26.8	0.54	0.33	0.02
March	3	3760	-1.4811	+0.7605	+0.0521	0.2216	152 48.8	+0.57	-0.29	-0.02

NOTE.—The Epoch is the 2400,000th day of the Julian Period = 1858, November 16.

# HELIOCENTRIC COÖRDINATES. 405

M A R S.									
1899.	Days from Epoch.	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .
March 13	3770	-1.5344	+0.6454	+0.0509	0.2215	157° 10.8	+0.59	-0.25	-0.02
23	3780	1.5779	0.5261	0.0494	0.2212	161 33.0	0.60	0.20	0.02
April 2	3790	1.6113	0.4035	0.0476	0.2206	165 55.8	0.62	0.16	0.02
12	3800	1.6343	0.2782	0.0455	0.2197	170 19.5	0.63	0.11	0.02
22	3810	1.6467	0.1512	0.0430	0.2186	174 44.4	0.64	0.06	0.02
May 2	3820	1.6483	+0.0232	0.0403	0.2172	179 10.8	0.65	-0.01	0.02
12	3830	1.6391	-0.1050	0.0373	0.2156	183 39.1	0.65	+0.04	0.01
22	3840	1.6189	0.2325	0.0341	0.2137	188 9.5	0.65	0.09	0.01
June 1	3850	1.5877	0.3584	0.0307	0.2116	192 42.4	0.65	0.15	0.01
11	3860	1.5457	0.4819	0.0270	0.2093	197 18.0	0.64	0.20	0.01
21	3870	1.4930	0.6020	0.0232	0.2068	201 56.8	0.63	0.25	0.01
July 1	3880	1.4297	0.7178	0.0191	0.2041	206 39.0	0.62	0.31	0.01
11	3890	1.3560	0.8284	0.0150	0.2011	211 24.8	0.60	0.36	-0.01
21	3900	1.2723	0.9329	0.0107	0.1980	216 14.7	0.57	0.42	0.00
31	3910	1.1791	1.0304	0.0064	0.1948	221 8.9	0.54	0.47	0.00
Aug. 10	3920	1.0768	1.1200	+0.0020	0.1914	226 7.6	0.51	0.53	0.00
20	3930	0.9659	1.2007	-0.0024	0.1878	231 11.2	0.47	0.58	0.00
30	3940	0.8473	1.2717	0.0068	0.1842	236 19.8	0.42	0.63	0.00
Sept. 9	3950	0.7217	1.3322	0.0111	0.1805	241 33.7	0.37	0.68	+0.01
19	3960	0.5899	1.3814	0.0154	0.1767	246 53.0	0.31	0.72	0.01
29	3970	0.4530	1.4184	0.0195	0.1729	252 17.9	0.24	0.76	0.01
Oct. 9	3980	0.3121	1.4428	0.0234	0.1692	257 48.4	0.17	0.79	0.01
19	3990	0.1683	1.4540	0.0271	0.1655	263 24.7	0.09	0.82	0.02
29	4000	-0.0229	1.4514	0.0306	0.1619	269 6.7	+0.01	0.84	0.02
Nov. 8	4010	+0.1227	1.4348	0.0337	0.1585	274 54.2	-0.07	0.85	0.02
18	4020	0.2671	1.4041	0.0366	0.1553	280 47.1	0.16	0.85	0.02
28	4030	0.4088	1.3591	0.0390	0.1522	286 45.2	0.25	0.84	0.02
Dec. 8	4040	0.5462	1.3001	0.0411	0.1494	292 48.1	0.34	0.82	0.03
18	4050	0.6779	1.2274	0.0427	0.1470	298 55.4	0.43	0.79	0.03
28	4060	0.8024	1.1415	0.0439	0.1449	305 6.5	0.52	0.74	0.03
38	4070	+0.9181	-1.0433	-0.0446	0.1432	311 21.0	-0.60	+0.69	+0.03
J U P I T E R.									
1899.	Days from Epoch.	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .
Jan. 2	3700	+4.71919	+1.49249	-0.11197	0.69468	17° 32' 52"	-175.71	-55.56	+4.17
12	3710	4.69500	1.56790	0.11169	0.69471	18 27 52	174.78	58.36	4.16
22	3720	4.66967	1.64293	0.11138	0.69474	19 22 51	173.80	61.15	4.14
Feb. 1	3730	4.64319	1.71756	0.11105	0.69478	20 17 49	172.77	63.91	4.13
11	3740	4.61559	1.79176	0.11069	0.69482	21 12 47	171.69	66.65	4.12
21	3750	4.58686	1.86553	0.11030	0.69486	22 7 44	170.56	69.37	4.10
March 3	3760	4.55701	1.93885	0.10989	0.69491	23 2 40	169.39	72.07	4.08
13	3770	4.52605	2.01169	0.10945	0.69497	23 57 36	168.18	74.75	4.06
23	3780	4.49398	2.08404	0.10898	0.69503	24 52 30	166.92	77.41	4.05
April 2	3790	4.46082	2.15588	0.10848	0.69510	25 47 24	165.61	80.04	4.03
12	3800	4.42657	2.22720	0.10796	0.69517	26 42 17	164.26	82.65	4.01
22	3810	4.39125	2.29798	0.10741	0.69525	27 37 8	162.86	85.23	3.98
May 2	3820	4.35486	2.36820	0.10684	0.69533	28 31 58	161.42	87.78	3.96
12	3830	4.31742	2.43785	0.10624	0.69542	29 26 47	159.94	90.31	3.94
22	3840	+4.27893	+2.50691	-0.10561	0.69551	30 21 35	-158.41	-92.81	+3.91

NOTE.—The Epoch is the 2400,000th day of the Julian Period = 1858, November 16.

# 406 HELIOCENTRIC COÖRDINATES.

JUPITER.										
1869.	Days from Epoch	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .	
June	1	3850	+4.23940	+2.57536	-0.10496	0.69561	31 16 21	-156.84	-95.28	+3.88
	11	3860	4.19884	2.64318	0.10429	0.69571	32 11 6	155.23	97.72	3.85
	21	3870	4.15727	2.71036	0.10359	0.69582	33 5 49	153.58	100.13	3.83
July	1	3880	4.11469	2.77688	0.10286	0.69593	34 0 31	151.89	102.50	3.80
	11	3890	4.07110	2.84272	0.10211	0.69604	34 55 10	150.16	104.85	3.77
Aug.	21	3900	4.02653	2.90788	0.10133	0.69616	35 49 48	148.39	107.17	3.74
	31	3910	3.98099	2.97234	0.10053	0.69629	36 44 24	146.59	109.45	3.70
	10	3920	3.93449	3.03609	0.09970	0.69642	37 38 59	144.75	111.70	3.67
	20	3930	3.88704	3.09910	0.09885	0.69655	38 33 31	142.87	113.91	3.63
	30	3940	3.83866	3.16136	0.09798	0.69669	39 28 1	140.95	116.08	3.60
Sept.	9	3950	3.78936	3.22287	0.09708	0.69683	40 22 29	139.00	118.22	3.56
	19	3960	3.73914	3.28360	0.09616	0.69698	41 16 55	137.02	120.33	3.52
Oct.	29	3970	3.68802	3.34354	0.09522	0.69713	42 11 18	135.01	122.40	3.49
	9	3980	3.63601	3.40267	0.09425	0.69729	43 5 39	132.96	124.43	3.45
Nov.	19	3990	3.58313	3.46099	0.09326	0.69745	43 59 58	130.88	126.42	3.41
	29	4000	3.52940	3.51848	0.09225	0.69762	44 54 15	128.77	128.37	3.37
	8	4010	3.47482	3.57513	0.09122	0.69779	45 48 29	126.63	130.29	3.33
Dec.	18	4020	3.41940	3.63092	0.09017	0.69796	46 42 40	124.46	132.17	3.28
	28	4030	3.36317	3.68585	0.08909	0.69814	47 36 49	122.26	134.00	3.24
	8	4040	3.30614	3.73990	0.08799	0.69832	48 30 55	120.04	135.79	3.20
	18	4050	3.24833	3.79306	0.08687	0.69850	49 24 59	117.79	137.54	3.15
	28	4060	3.18974	3.84532	0.08573	0.69869	50 18 59	115.52	139.26	3.11
	38	4070	+3.13040	+3.89667	-0.08457	0.69889	51 12 57	-113.22	-140.93	+3.06

SATURN.										
1869.	Days from Epoch.	<i>x</i> .	<i>y</i> .	<i>z</i> .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .	
Jan		3690	-3.61736	-9.32580	+0.29974	1.00032	248 46 20	+4.88	+12.58	-0.40
	2	3700	3.56837	9.34591	0.29811	1.00036	249 4 32	4.81	12.60	0.40
	12	3710	3.51927	9.36574	0.29646	1.00041	249 22 43	4.74	12.63	0.40
Feb.	22	3720	3.47007	9.38530	0.29480	1.00046	249 40 54	4.67	12.65	0.40
	1	3730	3.42077	9.40458	0.29313	1.00051	249 59 5	4.61	12.67	0.39
March	11	3740	3.37138	9.42359	0.29145	1.00055	250 17 16	4.54	12.69	0.39
	21	3750	3.32189	9.44232	0.28977	1.00060	250 35 26	4.47	12.71	0.39
	3	3760	3.27230	9.46077	0.28808	1.00064	250 53 36	4.40	12.73	0.39
	13	3770	3.22262	9.47895	0.28639	1.00069	251 11 46	4.34	12.76	0.39
	23	3780	3.17284	9.49685	0.28469	1.00073	251 29 56	4.27	12.78	0.38
April	2	3790	3.12297	9.51446	0.28298	1.00078	251 48 6	4.20	12.80	0.38
	12	3800	3.07300	9.53179	0.28126	1.00082	252 6 15	4.13	12.82	0.38
	22	3810	3.02295	9.54885	0.27953	1.00086	252 24 24	4.06	12.84	0.38
May	2	3820	2.97281	9.56563	0.27779	1.00090	252 42 33	4.00	12.85	0.37
	12	3830	2.92258	9.58212	0.27604	1.00094	253 0 41	3.93	12.87	0.37
June	22	3840	2.87227	9.59833	0.27429	1.00098	253 18 50	3.86	12.89	0.37
	1	3850	2.82187	9.61426	0.27253	1.00102	253 36 58	3.79	12.91	0.37
	11	3860	2.77139	9.62992	0.27076	1.00106	253 55 6	3.72	12.92	0.36
July	21	3870	2.72083	9.64530	0.26899	1.00110	254 13 14	3.65	12.94	0.36
	1	3880	2.67019	9.66039	0.26720	1.00114	254 31 22	3.58	12.96	0.36
	11	3890	2.61948	9.67520	0.26541	1.00117	254 49 29	3.51	12.98	0.35
	21	3900	-2.56869	-9.68973	+0.26361	1.00121	255 7 36	+3.44	+13.00	-0.35

NOTE.—The Epoch is the 2400,000th day of the Julian Period = 1858, November 16.



# HELIOCENTRIC COÖRDINATES. 407

## SATURN.

1869.	Days from Epoch.	$x$ .	$y$ .	$z$ .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .
July 31	3910	-2.51782	-9.70397	+0.26180	1.00124	255° 25' 43"	+3.38	+13.01	-0.35
Aug. 10	3920	2.46688	9.71793	0.25998	1.00128	255 43 50	3.31	13.03	0.35
20	3930	2.41586	9.73160	0.25816	1.00131	256 1 56	3.24	13.04	0.35
30	3940	2.36477	9.74499	0.25633	1.00135	256 20 3	3.17	13.06	0.34
Sept. 9	3950	2.31362	9.75809	0.25449	1.00138	256 38 9	3.10	13.07	0.34
19	3960	2.26240	9.77091	0.25264	1.00141	256 56 15	3.03	13.09	0.34
29	3970	2.21111	9.78344	0.25079	1.00144	257 14 21	2.96	13.10	0.34
Oct. 9	3980	2.15976	9.79569	0.24893	1.00148	257 32 27	2.89	13.12	0.33
19	3990	2.10835	9.80765	0.24706	1.00151	257 50 33	2.82	13.13	0.33
29	4000	2.05688	9.81932	0.24519	1.00154	258 8 39	2.75	13.14	0.33
Nov. 8	4010	2.00534	9.83071	0.24331	1.00157	258 26 44	2.68	13.15	0.33
18	4020	1.95375	9.84181	0.24142	1.00159	258 44 49	2.61	13.16	0.32
28	4030	1.90210	9.85263	0.23952	1.00162	259 2 54	2.54	13.17	0.32
Dec. 8	4040	1.85039	9.86316	0.23762	1.00165	259 20 59	2.47	13.18	0.32
18	4050	1.79868	9.87340	0.23571	1.00168	259 39 3	2.40	13.20	0.32
28	4060	1.74682	9.88335	0.23379	1.00170	259 57 8	2.33	13.21	0.31
38	4070	-1.69496	-9.89302	+0.23187	1.00173	260 15 13	+2.26	+13.22	-0.31

## URANUS.

1869.	Days from Epoch.	$x$ .	$y$ .	$z$ .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .
Jan. 22	3720	-4.99202	+18.07212	+0.13579	1.27299	105° 26' 30"	+0.14	-0.52	0.00
March 3	3760	5.14505	18.02245	0.13759	1.27284	105 55 59	0.15	0.52	0.00
April 12	3800	5.29773	17.97152	0.13937	1.27269	106 25 29	0.15	0.52	0.00
May 22	3840	5.45008	17.91926	0.14114	1.27254	106 55 1	0.16	0.52	0.00
July 1	3880	5.60201	17.86570	0.14290	1.27240	107 24 34	0.16	0.52	0.00
Aug. 10	3920	5.75351	17.81083	0.14465	1.27225	107 54 8	0.17	0.52	0.00
Sept. 19	3960	5.90467	17.75471	0.14639	1.27211	108 23 44	0.17	0.52	0.00
Oct. 29	4000	5.05539	17.69726	0.14812	1.27196	108 53 21	0.18	0.52	0.00
Dec. 8	4040	5.20575	17.63855	0.14983	1.27182	109 23 0	0.18	0.51	0.00
48	4080	-5.35565	+17.57855	+0.15153	1.27168	109 52 40	+0.19	-0.51	0.00

## NEPTUNE.

1869.	Days from Epoch.	$x$ .	$y$ .	$z$ .	Log Radius Vector.	Longitude in Orbit.	$-\frac{x^2}{r^3}$ .	$-\frac{y^2}{r^3}$ .	$-\frac{z^2}{r^3}$ .
Jan. 22	3720	+28.5992	+8.4335	-0.8492	1.47464	16° 26.5	-0.27	-0.08	+0.01
March 3	3760	28.5625	8.5549	0.8508	1.47463	16 41.1	0.27	0.08	0.01
April 12	3800	28.5253	8.6761	0.8523	1.47462	16 55.7	0.27	0.08	0.01
May 22	3840	28.4876	8.7972	0.8539	1.47461	17 10.4	0.27	0.08	0.01
July 1	3880	28.4493	8.9181	0.8554	1.47460	17 25.0	0.27	0.08	0.01
Aug. 10	3920	28.4105	9.0389	0.8569	1.47460	17 39.6	0.27	0.09	0.01
Sept. 19	3960	28.3712	9.1595	0.8584	1.47459	17 54.2	0.27	0.09	0.01
Oct. 29	4000	28.3314	9.2800	0.8599	1.47458	18 8.8	0.27	0.09	0.01
Dec. 8	4040	+28.2910	+9.4003	-0.8613	1.47457	18 23.5	-0.27	-0.09	+0.01

NOTE.—The Epoch is the 2400,000th day of the Julian Period = 1858, November 16.

408 HELIOCENTRIC COÖRDINATES.

INCLINATIONS AND NODES.

Planets.	Inclination.	Increase in 100 Days.	Longitude of Ascending Node.	Increase in 100 Days.
Mercury . . . .	7° 0' 8.8"	+0.01952	46° 39' 20"	11.639
Venus . . . .	3 23 36.3	+0.01195	75 25 35	9.001
Mars . . . .	1 51 2.1	—0.00586	48 27 42	7.579
Jupiter . . . .	1 18 39.5	—0.05689	99 1 38	9.993
Saturn . . . .	2 29 21.2	—0.03824	112 24 8	8.570
Uranus . . . .	0 46 29.8	+0.00834	73 16 44	4.898
Neptune . . . .	1 46 29.0	.	130 12 8	

NOTE.—The Epoch is the 2400,000th day of the Julian Period = 1858, November 16.

LOGARITHMS OF MASSES.

SUN'S = 1.

Mercury, 93.3129	The Earth, 94.44985	Jupiter, 96.979689	Uranus, 95.60371
Venus, 94.4089	Mars, 93.57176	Saturn, 96.45573	Neptune, 95.72630

## ECLIPSES IN 1869.

In the year 1869 there will be four Eclipses; two of the Sun, and two of the Moon.

I. A Partial Eclipse of the Moon, January 27, 1869, visible at Washington, with the following elements:—

Washington mean time of  $\delta$  in Right Ascension, January 27 <sup>d</sup> 8 <sup>h</sup> 43 <sup>m</sup> 30.7.

Sun's Right Ascension	20 <sup>h</sup> 42 <sup>m</sup> 41.08	Hourly Motion	10.32
Moon's Right Ascension	8 42 41.08	" "	155.91
Sun's Declination	—18° 12' 53.9"	Hourly Motion	+ 0' 39.5"
Moon's Declination	+17 25 2.4	" "	— 6 25.4
Sun's Equa. Hor. Par.	8.7	True Semidiameter	16 14.4
Moon's Equa. Hor. Par.	61 1.0	" "	16 36.8

From these elements may deduced the following results:—

Moon enters Penumbra, January	27 <sup>d</sup> 6 <sup>h</sup> 9.8 <sup>m</sup>	Washington mean time.
Moon enters Shadow	27 7 20.5	" "
Middle of the Eclipse	27 8 30.2	" "
Moon leaves Shadow	27 9 39.8	" "
Moon leaves Penumbra	27 10 50.5	" "

First contact of Shadow with Moon's limb 50° from north point towards the East, when the Moon is in the zenith, in longitude 287° 41' West from Washington, and in latitude 17° 40' North.

Last contact of Shadow with Moon's limb 31° from north point towards the West, when the Moon is in the zenith, in longitude 321° 4' West from Washington, and in latitude 17° 25' North.

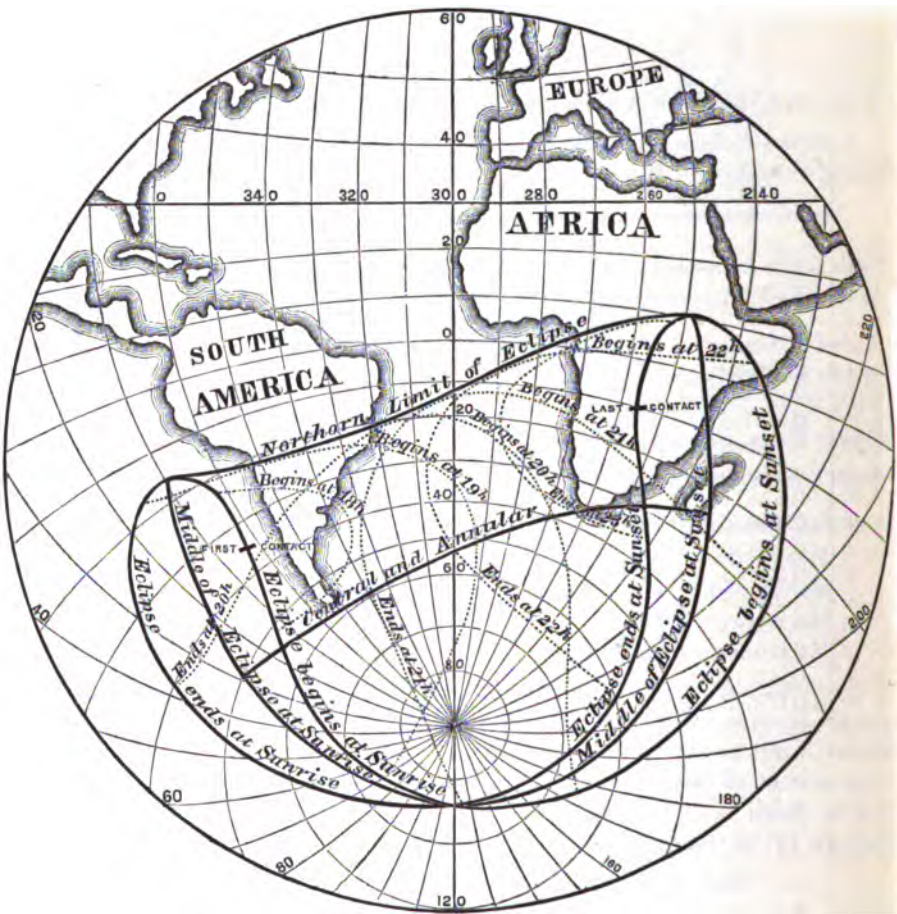
Magnitude of Eclipse = 0.458 (Moon's diameter = 1).

II. An Annular Eclipse of the Sun, February 10, 1869, invisible at Washington, with the following elements:—

Washington mean time of  $\delta$  in Right Ascension, February 10 <sup>d</sup> 20 <sup>h</sup> 20 <sup>m</sup> 37.6.

Sun's and Moon's R. A.	21 <sup>h</sup> 41 <sup>m</sup> 4.80	Hourly Motions	9.84 and 119.21
Sun's Declination	—13° 53' 2.6"	Hourly Motion	+ 0' 49.6"
Moon's Declination	—14 27 39.1	" "	+ 7 6.2
Sun's Equa. Hor. Par.	8.7	True Semidiameter	16 11.9
Moon's Equa. Hor. Par.	54 3.5	" "	14 43.1

OUTLINES AND PATH OF THE PENUMBRA, AND THE CENTRAL  
LINE OF THE ANNULAR ECLIPSE OF FEBRUARY 10, 1869.



From these elements may be deduced the following results:—

Eclipse begins on the Earth, February 10<sup>d</sup> 17<sup>h</sup> 46<sup>m</sup>.7, Washington mean time, in longitude 3° 12'.3 West from Washington, and in latitude 35° 39'.0 South.

Central Eclipse begins on the Earth 19<sup>h</sup> 5<sup>m</sup>.7, in longitude 29° 55'.3 West from Washington, and in latitude 50° 8'.8 South.

Central Eclipse at Noon 20<sup>h</sup> 20<sup>m</sup>.6, in longitude 301° 32'.0 West from Washington, and in latitude 54° 6'.4 South.

Central Eclipse ends on the Earth 22<sup>h</sup> 11<sup>m</sup>.0, in longitude 232° 39'.7 West from Washington, and in latitude 24° 41'.3 South.

Eclipse ends on the Earth 23<sup>h</sup> 30<sup>m</sup>.0, in longitude 256° 27'.3 West from Washington, and in latitude 9° 47'.4 South.

DATA FOR COMPUTING THE ECLIPSE FOR ANY PLACE, FOR PENUMBRA.

Wash. M. Time.	A.	B.	C.	log E.	log F.	log G.	log H.	$\mu$
<sup>h</sup> <sup>m</sup>				9.98	9.98	—9.38	—9.37	° ' "
17 40	—1.31481	—0.37936	—1.52592	6548	7567	9415	2813	261 22 25.0
17 50	1.23296	0.36005	1.50664	6552	7571	9348	2743	263 52 25.8
18 0	1.15110	0.34073	1.48735	6556	7575	9280	2673	266 22 26.5
18 10	1.06925	0.32141	1.46805	6560	7579	9213	2603	268 52 27.3
18 20	0.98739	0.30208	1.44875	6565	7583	9146	2533	271 22 28.0
18 30	0.90553	0.28274	1.42944	6569	7588	9078	2463	273 52 28.8
18 40	0.82368	0.26340	1.41012	6573	7592	9011	2392	276 22 29.6
18 50	0.74182	0.24406	1.39080	6578	7596	8943	2322	278 52 30.3
19 0	0.65996	0.22471	1.37147	6582	7600	8876	2252	281 22 31.1
19 10	0.57811	0.20535	1.35213	6586	7604	8808	2181	283 52 31.8
19 20	0.49625	0.18599	1.33279	6590	7608	8741	2111	286 22 32.6
19 30	0.41439	0.16662	1.31344	6595	7612	8673	2041	288 52 33.4
19 40	0.33254	0.14725	1.29408	6599	7616	8606	1970	291 22 34.1
19 50	0.25068	0.12787	1.27472	6603	7621	8538	1900	293 52 34.9
20 0	0.16883	0.10848	1.25536	6608	7625	8471	1830	296 22 35.7
20 10	0.08698	0.08909	1.23599	6612	7629	8403	1759	298 52 36.4
20 20	—0.00512	0.06970	1.21661	6616	7633	8336	1689	301 22 37.2
20 30	+0.07673	0.05030	1.19722	6621	7637	8268	1618	303 52 38.0
20 40	0.15858	0.03090	1.17783	6625	7641	8200	1548	306 22 38.7
20 50	0.24043	—0.01149	1.15843	6629	7645	8133	1478	308 52 39.5
21 0	0.32227	+0.00793	1.13902	6633	7650	8065	1407	311 22 40.3
21 10	0.40411	0.02735	1.11961	6638	7654	7997	1337	313 52 41.0
21 20	0.48595	0.04678	1.10019	6642	7658	7930	1266	316 22 41.8
21 30	0.56779	0.06621	1.08076	6646	7662	7862	1196	318 52 42.6
21 40	0.64962	0.08565	1.06133	6651	7666	7794	1125	321 22 43.3
21 50	0.73145	0.10509	1.04189	6655	7670	7727	1054	323 52 44.1
22 0	0.81328	0.12453	1.02245	6659	7674	7659	0984	326 22 44.9
22 10	0.89511	0.14398	1.00300	6664	7678	7591	0913	328 52 45.7
22 20	0.97693	0.16344	0.98354	6668	7682	7523	0843	331 22 46.4
22 30	1.05875	0.18290	0.96408	6672	7687	7455	0772	333 52 47.2
22 40	1.14057	0.20237	0.94461	6676	7691	7388	0701	336 22 48.0
22 50	1.22238	0.22184	0.92514	6681	7695	7320	0631	338 52 48.8
23 0	1.30419	0.24131	0.90566	6685	7699	7252	0560	341 22 49.5
23 10	1.38599	0.26079	0.88617	6689	7703	7184	0489	343 52 50.3
23 20	1.46779	0.28028	0.86668	6694	7707	7116	0419	346 22 51.1
23 30	+1.54959	+0.29977	—0.84718	6698	7711	7048	0348	348 52 51.9

FOR SHADOW.					
Washington Mean Time.	B.	C.	Washington Mean Time.	B.	C.
<sup>h</sup> <sup>m</sup>			<sup>h</sup> <sup>m</sup>		
19 0	—0.77071	—0.82547	20 40	—0.57690	—0.63183
19 10	0.75135	0.80613	20 50	0.55749	0.61243
19 20	0.73199	0.78679	21 0	0.53807	0.59302
19 30	0.71262	0.76744	21 10	0.51865	0.57361
19 40	0.69325	0.74808	21 20	0.49922	0.55419
19 50	0.67387	0.72872	21 30	0.47979	0.53476
20 0	0.65448	0.70936	21 40	0.46035	0.51533
20 10	0.63509	0.68999	21 50	0.44091	0.49589
20 20	0.61570	0.67061	22 0	0.42147	0.47645
20 30	0.59630	0.65122	22 10	0.40202	0.45700
20 40	—0.57690	—0.63183	22 20	—0.38256	—0.43754

A and  $\mu$  are given in the Table for Penumbra, and the values of log E, log F, log G, and log H may be obtained from corresponding values for Penumbra, by numerically increasing log E and decreasing log F by 0.000002, and by numerically decreasing log G by 0.000039 and increasing log H by 0.000041.

CHANGES OF THE QUANTITIES IN THE TABLES OF DATA.\*

Washington Mean Time.	For one Minute.			For one Second.		
	A.	B.	C.	A'.	B'.	C'.
<sup>h</sup> <sup>m</sup>						
17 30	+8185.3	+1930.3	+1927.3	+136.42	+32.17	+32.12
18 0	8185.6	1932.0	1929.3	136.43	32.20	32.15
18 30	8185.7	1933.7	1931.3	136.43	32.23	32.19
19 0	8185.7	1935.4	1933.3	136.43	32.26	32.22
19 30	8185.5	1937.1	1935.2	136.42	32.28	32.25
20 0	8185.3	1938.7	1937.1	136.42	32.31	32.28
20 30	8184.9	1940.2	1939.0	136.41	32.34	32.32
21 0	8184.3	1941.8	1940.9	136.40	32.36	32.35
21 30	8183.5	1943.3	1942.8	136.39	32.39	32.38
22 0	8182.7	1944.8	1944.7	136.38	32.41	32.41
22 30	8181.8	1946.3	1946.5	136.36	32.44	32.44
23 0	8180.7	1947.8	1948.4	136.34	32.46	32.47
23 30	+8179.3	+1949.3	+1950.2	+136.32	+32.49	+32.50

III. A Partial Eclipse of the Moon, July 22, 1869, invisible at Washington, with the following elements:—

Washington mean time of  $\varphi$  in Right Ascension, July 22 <sup>d</sup> 21 <sup>h</sup> 3 <sup>m</sup> 59.9.

Sun's Right Ascension	<sup>h</sup> <sup>m</sup> <sup>s</sup> 8 11 34.85	Hourly Motion	<sup>s</sup> 9.92
Moon's Right Ascension	20 11 34.85	" "	131.53
Sun's Declination	+20° 1' 1.2	Hourly Motion	— 0' 31.0
Moon's Declination	—19 22 5.3	" "	+ 3 56.6
Sun's Equa. Hor. Par.	8.4	True Semidiameter	15 45.0
Moon's Equa. Hor. Par.	55 28.3	" "	15 6.2

\* In units of the sixth place of decimals.

From these elements may be deduced the following results:—

Moon enters Penumbra, July	22 <sup>d</sup> 18 <sup>h</sup> 11.9 <sup>m</sup>	Washington mean time.
Moon enters Shadow	22 19 30.9	“ “
Middle of the Eclipse	22 20 54.4	“ “
Moon leaves Shadow	22 22 17.9	“ “
Moon leaves Penumbra	22 23 36.9	“ “

First contact of Shadow with Moon's limb  $127^{\circ}$  from north point towards the East, when the Moon is in the zenith, in longitude  $111^{\circ} 59'$  West from Washington, and in latitude  $19^{\circ} 35'$  South.

Last contact of Shadow with Moon's limb  $141^{\circ}$  from north point towards the West, when the Moon is in the zenith, in longitude  $152^{\circ} 18'$  West from Washington, and in latitude  $19^{\circ} 24'$  South.

Magnitude of Eclipse = 0.566 (Moon's diameter = 1).

IV. A Total Eclipse of the Sun, August 7, 1869, visible at Washington, with the following elements:—

Washington mean time of  $\delta$  in Right Ascension, August 7 4<sup>h</sup> 37<sup>m</sup> 44.6<sup>s</sup>.

Sun's and Moon's R. A.	9 11 13.33	Hourly Motions	9.55 and 151.20
Sun's Declination	+16° 14' 48.1"	Hourly Motion	— 0' 42.4"
Moon's Declination	+16 57 33.3	“ “	— 7 37.7
Sun's Equa. Hor. Par.	8.5	True Semidiameter	15 46.8
Moon's Equa. Hor. Par.	60 22.0	“ “	16 26.2

From these elements may be deduced the following results:—

Eclipse begins on the Earth, August 7<sup>d</sup> 2<sup>h</sup> 29<sup>m</sup>.7, Washington mean time, in longitude  $138^{\circ} 37'.4$  West from Washington, and in latitude  $36^{\circ} 53'.3$  North.

Central Eclipse begins 3<sup>h</sup> 37<sup>m</sup>.8, in longitude  $165^{\circ} 26'.4$  West from Washington, and in latitude  $52^{\circ} 41'.9$  North.

Central Eclipse at Noon 4<sup>h</sup> 37<sup>m</sup>.7, in longitude  $68^{\circ} 4'.6$  West from Washington, and in latitude  $61^{\circ} 46'.9$  North.

Central Eclipse ends 6<sup>h</sup> 7<sup>m</sup>.6, in longitude  $350^{\circ} 26'.4$  West from Washington, and in latitude  $31^{\circ} 15'.2$  North.

Eclipse ends on the Earth 7<sup>h</sup> 15<sup>m</sup>.6, in longitude  $13^{\circ} 10'.0$  West from Washington, and in latitude  $14^{\circ} 48'.9$  North.

#### DATA FOR COMPUTING THE ECLIPSE FOR ANY PLACE, FOR PENUMBRA.

Wash. M. Time.	A.	B.	C.	log E.	log F.	log G.	log H.	$\mu$
<sup>h</sup> <sup>m</sup>				9.98	9.98	+9.44	+9.45	
2 20	—1.29111	+1.50843	+0.43839	2831	1661	0533	4259	33° 38' 5.3
2 30	1.19738	1.48935	0.41932	2835	1666	0482	4210	36 8 6.9
2 40	1.10365	1.47026	0.40024	2839	1670	0432	4161	38 38 8.4
2 50	1.00992	1.45116	0.38115	2843	1674	0381	4112	41 8 10.0
3 0	0.91619	1.43206	0.36206	2847	1679	0330	4063	43 38 11.6
3 10	0.82246	1.41295	0.34296	2851	1683	0280	4014	46 8 13.2
3 20	0.72873	1.39382	0.32385	2855	1687	0229	3965	48 38 14.8
3 30	0.63499	1.37468	0.30473	2860	1691	0178	3916	51 8 16.4
3 40	0.54125	1.35553	0.28560	2864	1696	0127	3867	53 38 18.0
3 50	0.44751	1.33638	0.26646	2868	1700	0077	3818	56 8 19.6
4 0	—0.35377	+1.31722	+0.24732	2872	1704	0026	3769	58 38 21.2

OUTLINES AND PATH OF THE PENUMBRA, AND THE CENTRAL  
LINE OF THE TOTAL ECLIPSE OF AUGUST 7, 1869.





## DATA FOR COMPUTING THE ECLIPSE FOR ANY PLACE, FOR PENUMBRA.

Wash. M. Time.	A.	B.	C.	log E.	log F.	log G.	log H.	$\mu$
h m				9.98	9.98	+9.43	+9.45	
4 10	-0.26003	+1.29805	+0.22817	2876	1709	9975	3720	61° 8' 22.8
4 20	0.16629	1.27887	0.20901	2880	1713	9924	3671	63 38 24.3
4 30	-0.07254	1.25969	0.18984	2885	1717	9874	3622	66 8 25.9
4 40	+0.02120	1.24050	0.17066	2889	1722	9823	3573	68 38 27.5
4 50	0.11494	1.22129	0.15148	2893	1726	9772	3523	71 8 29.1
5 0	0.20868	1.20207	0.13229	2897	1730	9721	3474	73 38 30.7
5 10	0.30242	1.18284	0.11309	2901	1735	9670	3425	76 8 32.3
5 20	0.39616	1.16361	0.09389	2905	1739	9619	3376	78 38 33.9
5 30	0.48989	1.14437	0.07468	2910	1743	9568	3327	81 8 35.5
5 40	0.58363	1.12512	0.05546	2914	1748	9518	3278	83 38 37.1
5 50	0.67736	1.10586	0.03624	2918	1752	9467	3229	86 8 38.7
6 0	0.77109	1.08659	+0.01701	2922	1756	9416	3180	88 38 40.3
6 10	0.86482	1.06731	-0.00223	2926	1761	9365	3130	91 8 41.9
6 20	0.95854	1.04802	0.02148	2930	1765	9314	3081	93 38 43.5
6 30	1.05226	1.02873	0.04073	2935	1769	9263	3032	96 8 45.1
6 40	1.14598	1.00943	0.05999	2939	1773	9212	2983	98 38 46.7
6 50	1.23969	0.99012	0.07926	2943	1778	9161	2934	101 8 48.3
7 0	1.33340	0.97080	0.09854	2947	1782	9110	2884	103 38 49.9
7 10	1.42710	0.95147	0.11782	2951	1786	9059	2835	106 8 51.5
7 20	+1.52080	+0.93213	-0.13711	2955	1791	9008	2786	108 38 53.1

## FOR SHADOW.

Washington Mean Time.	B.	C.	Washington Mean Time.	B.	C.
h m			h m		
3 30	+0.82887	+0.85054	4 50	+0.67547	+0.69730
3 40	0.80972	0.83141	5 0	0.65625	0.67811
3 50	0.79057	0.81227	5 10	0.63702	0.65891
4 0	0.77141	0.79313	5 20	0.61779	0.63971
4 10	0.75224	0.77398	5 30	0.59855	0.62050
4 20	0.73306	0.75482	5 40	0.57930	0.60128
4 30	0.71387	0.73565	5 50	0.56004	0.58205
4 40	0.69468	0.71648	6 0	0.54078	0.56282
4 50	+0.67547	+0.69730	6 10	+0.52150	+0.54358

A and  $\mu$  are given in the Table for Penumbra, and the values of log E, log F, log G, and log H may be obtained from corresponding values for Penumbra, by numerically decreasing log E and increasing log F by 0.000003, and by numerically increasing log G by 0.000034 and decreasing log H by 0.000033.

## CHANGES OF THE QUANTITIES IN THE TABLES OF DATA.\*

Washington Mean Time.	For one Minute.			For one Second.		
	A.	B.	C.	A'.	B'.	C'.
h m						
2 0	+9371.9	-1905.4	-1905.1	+156.20	-31.76	-31.75
2 30	9372.7	1908.2	1907.5	156.21	31.80	31.79
3 0	9373.3	1911.0	1909.9	156.22	31.85	31.83
3 30	9373.7	1913.8	1912.3	156.23	31.90	31.87
4 0	9374.0	1916.5	1914.7	156.23	31.94	31.91
4 30	9374.1	1919.2	1917.1	156.23	31.99	31.95
5 0	9373.9	1922.0	1919.3	156.23	32.03	31.99
5 30	9373.5	1924.7	1921.4	156.22	32.08	32.02
6 0	9372.8	1927.3	1923.6	156.21	32.12	32.06
6 30	9371.8	1929.8	1925.8	156.20	32.16	32.10
7 0	9370.6	1932.4	1927.9	156.18	32.21	32.13
7 30	+9369.3	-1935.0	-1930.0	+156.16	-32.25	-32.17

\* In units of the sixth place of decimals.

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of Conj.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\phi$	Log cos $\phi$
Jan. 1	$\nu$ Leonis	5	+90	+11	1 39.1	+10 33 44	+0.7276	0.5901	-.1529	9.3543	9.9886
1	$\alpha$ Leonis	1 $\frac{1}{2}$	+72	-1	5 51.2	-9 23 41	+0.5333	.5878	-.1588	9.3389	.9894
1	34 Leonis	6	-28	-76	7 10.5	-8 7 19	-1.0666	.5871	-.1604	9.3337	.9869
1	$\iota$ Leonis	5	-23	-79	23 1.2	+7 8 13	-1.0109	.5785	-.1790	9.2897	.9916
2	$\chi$ Leonis	5	+90	+21	5 49.1	-10 18 41	+0.9482	.5752	-.1853	9.1458	.9957
2	B.A.C. 3837	6 $\frac{1}{2}$	+8	-66	9 41.3	-6 34 48	-0.5106	.5732	-.1884	9.1835	.9949
2	$\sigma$ Leonis	4	+90	+19	12 47.8	-3 35 0	+0.9391	.5716	-.1906	9.0699	.9970
3	B.A.C. 3996	6	+2	-77	1 6.5	+8 17 44	-0.6230	.5662	-.1975	9.0136	.9977
3	$\delta$ Virginis	6	+31	-37	5 55.9	-11 2 58	-0.0287	.5642	-.1994	8.8835	.9987
3	10 Virginis	6	+90	+13	10 17.4	-6 50 29	+0.8716	.5626	-.2005	8.6622	.9995
4	65 Virginis	6	+86	+32	19 51.3	+1 35 28	+1.1332	.5545	-.1982	8.8685	.9988
4	66 Virginis	6	+86	+47	20 24.9	+2 7 52	+1.2697	.5544	-.1981	8.8924	.9987
5	80 Virginis	6	+70	-7	1 29.4	+7 2 18	+0.5283	.5539	-.1959	8.9160	.9985
6	$\zeta$ Libræ	6	+79	+3	13 56.5	-5 43 12	+0.7083	.5544	-.1686	8.9294	.9914
6	$\zeta$ Libræ	6	+33	-35	15 2.9	-4 38 58	+0.0174	.5544	-.1675	8.92758	.9921
6	18 Libræ, pr.	6 $\frac{1}{2}$	+9	-63	16 2.7	-3 41 10	-0.4249	.5545	-.1665	8.92653	.9925
7	B.A.C. 5070	6	-22	-90	3 31.8	+7 24 55	-0.9194	.5559	-.1533	8.93142	.9906
7	$\gamma$ Libræ	4 $\frac{1}{2}$	+76	+13	8 49.8	-11 27 43	+0.8620	.5567	-.1468	8.93941	.9862
7	$\eta$ Libræ	6	+75	+49	12 44.3	-7 41 6	+1.2511	.5572	-.1416	8.94200	.9844
7	48 Libræ	4 $\frac{1}{2}$	-35	-90	19 13.2	-1 25 15	-1.0678	.5582	-.1329	8.93805	.9871
8	$\phi$ Ophiuchi	5	+9	-56	10 10.2	-10 58 35	-0.3217	.5604	-.1106	8.94488	.9891
8	24 Scorpii	5	+50	-13	14 52.2	-6 26 10	+0.4124	.5612	-.1030	8.94777	.9795
8	B.A.C. 5695	6	-50	-90	21 25.6	-0 6 10	-1.1800	.5617	-.0920	8.94557	.9815
9	29 Ophiuchi	6	+72	+12	0 0.9	+2 23 48	+0.8249	.5621	-.0880	8.95057	.9765
9	B.A.C. 5771	6 $\frac{1}{2}$	-19	-90	2 55.8	+5 12 43	-0.7645	.5625	-.0830	8.94765	.9796
9	B.A.C. 5839	6 $\frac{1}{2}$	-35	-90	8 10.7	+10 16 51	-0.9831	.5629	-.0740	8.94809	.9791
10	B.A.C. 6060	6 $\frac{1}{2}$	-18	-90	0 23.3	+1 56 12	-0.7068	.5635	-.0447	8.95076	.9763
10	B.A.C. 6081	6 $\frac{1}{2}$	+70	+17	2 11.5	+3 40 44	+0.8896	.5634	-.0417	8.95408	.9721
10	15 Sagittarii	5	+69	+37	9 2.8	+10 17 58	+1.1212	.5631	-.0291	8.95496	.9708
10	16 Sagittarii	6	+70	+7	9 3.6	+10 18 42	+0.7527	.5631	-.0291	8.95427	.9718
10	21 Sagittarii	5	+70	+14	13 38.0	-9 16 13	+0.8404	.5629	-.0205	8.95465	.9713
10	B.A.C. 6287	6	-54	-90	15 52.3	-7 6 33	-1.1511	.5629	-.0165	8.95084	.9762
10	B.A.C. 6292	6	-39	-90	16 23.2	-6 36 42	-0.9632	.5625	-.0153	8.95124	.9757
13	21 Capricor.	6	+72	+43	14 14.2	-11 4 1	+1.1940	.5431	+1.018	8.94909	.9781
13	$\theta$ Capricor.	4	+72	+36	16 43.0	-8 39 57	+1.1332	.5420	+1.054	8.94841	.9788
13	29 Capricor.	6	-6	-78	21 34.1	-3 57 58	-0.5891	.5309	+1.119	8.94328	.9835
14	42 Capricor.	6	+15	-51	10 25.3	+8 29 23	-0.2465	.5347	+1.279	8.94025	.9857
14	44 Capricor.	6	+43	-22	11 10.4	+9 13 8	+0.2565	.5346	+1.286	8.94130	.9849
14	45 Capricor.	6	+75	+4	11 38.5	+9 40 24	+0.7079	.5343	+1.292	8.94228	.9842
14	$\mu$ Capricor.	5	+30	-35	16 18.8	-9 47 48	+0.0126	.5326	+1.343	8.93887	.9866
15	42 Aquarii	6	+77	+19	4 19.9	+1 51 37	+0.9460	.5281	+1.466	8.93677	.9879
15	$\sigma$ Aquarii	4 $\frac{1}{2}$	+13	-57	11 30.3	+8 49 13	-0.3474	.5253	+1.534	8.92939	.9914
15	58 Aquarii	6	+31	-37	12 2.3	+9 20 16	-0.0121	.5253	+1.537	8.93025	.9911
15	64 Aquarii	6 $\frac{1}{2}$	+13	-58	15 59.8	-10 49 9	-0.3591	.5240	+1.571	8.92692	.9924
15	70 Aquarii	6	+79	+23	20 48.7	-6 8 46	+1.0044	.5225	+1.610	8.92901	.9916
16	$h$ Aquarii	6	-6	-90	5 35.4	+2 22 43	-0.7160	.5201	+1.672	8.91647	.9953
16	$h^2$ Aquarii	7	-1	-81	5 40.6	+2 27 47	-0.6344	.5201	+1.673	8.91678	.9952
16	$h^3$ Aquarii	7	+13	-60	5 58.4	+2 45 2	-0.3819	.5200	+1.674	8.91769	.9950
16	$h^4$ Aquarii	7	+4	-71	6 40.6	+3 26 1	-0.5349	.5200	+1.679	8.91646	.9953
16	$\chi$ Aquarii	5 $\frac{1}{2}$	+57	-15	11 47.2	+8 23 47	+0.3770	.5186	+1.711	8.91667	.9953
17	27 Piscium	5 $\frac{1}{2}$	+20	-53	10 8.3	+6 6 41	-0.2820	.5151	+1.815	8.8735	.9988
17	29 Piscium	5 $\frac{1}{2}$	+7	-73	11 49.5	+7 45 0	-0.5589	.5150	+1.820	8.8166	.9991
17	B.A.C. 81	6 $\frac{1}{2}$	+87	+7	23 59.5	-4 25 41	+0.7771	.5148	+1.851	8.87109	.9994
18	14 Ceti	6 $\frac{1}{2}$	+35	-37	5 54.1	+1 18 48	-0.0218	.5150	+1.861	8.83311	.9990
18	15 Ceti	6 $\frac{1}{2}$	+49	-23	7 16.2	+2 38 36	+0.2308	0.5150	+1.862	8.83306	9.9999

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta'$	Log cos $\delta'$
Jan. 18	26 Ceti, <i>mult.</i>	6 $\frac{1}{2}$	+90	+3	20 58.9	- 8 2 10	+0.7104	0.5168	+1867	8.0621	0.0000
18	29 Ceti	6 $\frac{1}{2}$	+62	-13	23 11.6	- 5 53 17	+0.4158	.5171	+1866	8.3574	9.9999
19	33 Ceti	6	+47	-26	0 33.6	- 4 33 34	+0.1871	.5171	+1865	8.4838	.9998
19	35 Ceti	6 $\frac{1}{2}$	+57	-17	1 36.4	- 3 32 39	+0.3481	.5177	+1864	8.4914	.9998
19	f Piscium	6	+15	-60	4 22.9	- 0 50 54	-0.3904	.5186	+1861	8.7073	.9994
19	B.A.C. 408	6 $\frac{1}{2}$	-33	-86	6 57.8	+ 1 39 29	-1.1455	.5190	+1857	8.8490	.9989
19	v Piscium	4 $\frac{1}{2}$	+26	-46	16 44.6	+11 9 17	-0.1789	.5219	+1835	8.9246	.9985
20	64 Ceti	6 $\frac{1}{2}$	- 9	-82	8 5.8	+ 2 3 11	-0.8009	.5280	+1777	9.1411	.9958
20	z Ceti	4 $\frac{1}{2}$	-19	-82	8 55.2	+ 2 51 4	-0.9528	.5282	+1773	9.1558	.9955
20	B.A.C. 741	6 $\frac{1}{2}$	-15	-81	14 42.2	+ 8 27 35	-0.8929	.5311	+1742	9.1999	.9945
20	z Ceti	4	+90	+ 9	16 33.2	+10 15 13	+0.7745	.5322	+1731	9.1364	.9959
20	B.A.C. 830	6	+ 9	-64	23 37.8	- 6 53 15	-0.5000	.5359	+1685	9.2473	.9931
21	$\mu$ Ceti	5	+59	-13	0 49.8	- 5 43 32	+0.3680	.5367	+1678	9.2202	.9939
21	B.A.C. 987	6 $\frac{1}{2}$	- 6	-75	13 36.1	+ 6 38 33	-0.7482	.5445	+1573	9.3369	.9895
21	f Tauri	4	+90	+10	22 48.8	- 8 26 43	+0.7284	.5508	+1482	9.3348	.9896
22	Wei. III. 1085	8 $\frac{1}{2}$	+74	+ 2	14 2.5	+ 6 16 21	+0.5499	.5618	+1300	9.4034	.9856
22	Wei. IV. 24	9	+89	+10	16 55.9	+ 9 3 45	+0.6803	.5642	+1261	9.4099	.9852
22	Lal. 7753	7 $\frac{1}{2}$	+33	-30	17 1.1	+ 9 8 46	-0.0518	.5644	+1260	9.4296	.9837
22	B.A.C. 1281	7	- 8	-74	17 3.9	+ 9 11 29	-0.7787	.5644	+1259	9.4482	.9822
22	Rumk. 1103	7	+54	-11	17 8.2	+ 9 11 34	+0.2961	.5645	+1258	9.4209	.9844
22	Rumk. 1108	9	+90	+37	17 36.6	+ 9 43 3	+1.0760	.5648	+1251	9.4013	.9857
22	Rumk. 1123	8 $\frac{1}{2}$	+90	+52	18 28.1	+10 32 45	+1.2198	.5654	+1241	9.4003	.9858
22	48 Tauri	6	+90	+16	19 10.8	+11 13 55	+0.7736	.5660	+1229	9.4149	.9848
22	Rumk. 1136	6	+33	-28	19 37.9	+11 40 4	-0.0246	.5663	+1221	9.4373	.9831
22	$\gamma$ Tauri	4	+90	+14	20 57.2	-11 3 24	+0.7398	.5673	+1203	9.4216	.9843
22	55 Tauri	7	+25	-38	20 59.2	-11 1 24	-0.1910	.5673	+1203	9.4457	.9824
22	Rumk. 1161		-45	-73	21 38.8	-10 23 16	-1.2142	.5678	+1193	9.4724	.9800
22	Rumk. 1163	8	+14	-50	21 42.1	-10 20 0	-0.3877	.5679	+1192	9.4531	.9818
22	$\delta$ Tauri	4	-33	-73	22 17.6	- 9 45 46	-1.1059	.5683	+1184	9.4717	.9801
22	63 Tauri	6	+20	-43	22 31.4	- 9 32 28	-0.2840	.5683	+1181	9.4525	.9818
22	B.A.C. 1351	6 $\frac{1}{2}$	+29	-34	22 33.0	- 9 30 57	-0.1265	.5683	+1181	9.4487	.9821
22	$\alpha$ Tauri	6	-20	-73	22 48.4	- 9 16 5	-0.9465	.5685	+1177	9.4693	.9803
22	Lal. 8249	7 $\frac{1}{2}$	+ 5	-61	22 55.8	- 9 8 55	-0.5532	.5686	+1175	9.4602	.9811
22	Lal. 8256	8	+17	-47	22 58.5	- 9 6 19	-0.3458	.5686	+1174	9.4554	.9815
22	70 Tauri	7	+90	+12	23 30.6	- 8 35 22	+0.6976	.5690	+1166	9.4306	.9836
22	Lal. 8311	8	+90	+45	23 43.3	- 8 23 8	+1.1521	.5692	+1163	9.4193	.9845
22	Rumk. 1188	6 $\frac{1}{2}$	+90	+45	23 43.5	- 8 22 56	+1.1540	.5692	+1163	9.4192	.9845
22	Rumk. 1189		+24	-39	23 49.8	- 8 16 47	-0.2179	.5693	+1161	9.4546	.9816
22	71 Tauri	6	+90	+37	23 50.0	- 8 16 40	+1.0683	.5693	+1161	9.4219	.9843
22	Rumk. 1192		+ 7	-59	23 52.9	- 8 13 51	-0.5250	.5693	+1160	9.4623	.9809
23	Rumk. 1198	6	+90	+51	0 9.7	- 7 57 37	+1.2045	.5695	+1156	9.4192	.9845
23	Rumk. 1200		+90	+46	0 22.7	- 7 45 5	+1.1572	.5699	+1153	9.4211	.9844
23	Rumk. 1203		+65	- 2	0 41.7	- 7 26 45	+0.4517	.5701	+1148	9.4404	.9828
23	75 Tauri	6	+61	- 5	0 44.4	- 7 24 11	+0.3965	.5701	+1147	9.4420	.9827
23	$\theta$ Tauri	4 $\frac{1}{2}$	+90	+19	0 47.9	- 7 20 45	+0.8143	.5702	+1146	9.4314	.9836
23	$\alpha$ Tauri	4 $\frac{1}{2}$	+90	+26	0 50.5	- 7 18 17	+0.9141	.5702	+1146	9.4290	.9837
23	Rumk. 1210		+82	+ 8	0 58.6	- 7 10 30	+0.6282	.5703	+1144	9.4368	.9831
23	Rumk. 1212	6	+10	+73	1 5.9	- 7 3 24	-0.7998	.5703	+1142	9.4722	.9800
23	Rumk. 1214		+36	+73	1 9.7	- 6 59 44	-1.1228	.5704	+1141	9.4798	.9793
23	Rumk. 1215	7	+38	+73	1 10.3	- 6 59 10	-1.1537	.5704	+1140	9.4805	.9792
23	80 Tauri, <i>mul.</i>	6	+90	+54	1 29.5	- 6 40 36	+1.2257	.5706	+1135	9.4227	.9842
23	B.A.C. 1391	5	+87	+10	1 39.7	- 6 30 51	+0.6651	.5707	+1133	9.4378	.9831
23	81 Tauri	5 $\frac{1}{2}$	+90	+50	1 42.8	- 6 27 51	+1.1926	.5707	+1132	9.4242	.9841
23	B.A.C. 1394	7	+90	+13	1 45.6	- 6 25 9	+0.7175	.5707	+1132	9.4368	.9831
23	Rumk. 1227	7	+90	+40	2 1.2	- 6 10 4	+1.0967	.5709	+1128	9.4277	9.9838

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
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Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$
Jan. 23	85 Tauri	6	+90	+39	2 14.1	- 5 57 36	+1.0817	0.5711	+1.125	9.4287	9.9838
23	Rumk. 1232		+56	- 8	2 26.7	- 5 45 30	+0.3270	.5712	+1.121	9.4486	.9821
23	Rumk. 1233		-22	-75	2 32.9	- 5 39 28	-0.9732	.5713	+1.120	9.4800	.9792
23	Rumk. 1234		+90	+30	2 39.1	- 5 33 29	+0.9647	.5714	+1.118	9.4330	.9835
23	B.A.C. 1406		+88	+11	3 0.1	- 5 13 15	+0.6713	.5717	+1.113	9.4415	.9827
23	Rumk. 1238	10	+71	+ 2	3 21.4	- 4 52 43	+0.5145	.5720	+1.107	9.4465	.9823
23	Lal. 8599	9	- 8	-73	3 25.6	- 4 48 39	-0.7672	.5720	+1.106	9.4775	.9795
23	Lal. 8610	8	+38	-24	3 34.1	- 4 40 32	+0.0275	.5722	+1.104	9.4590	.9812
23	Lal. 8613		+26	-36	3 35.4	- 4 39 12	-0.1800	.5722	+1.103	9.4641	.9808
23	$\alpha$ Tauri	1	+76	+ 6	3 59.2	- 4 16 18	+0.5738	.5725	+1.097	9.4467	.9823
23	89 Tauri	7	+44	-18	4 57.9	- 3 19 39	+0.1355	.5732	+1.082	9.4601	.9811
23	Rumk. 1241		+90	+16	5 45.4	- 2 33 48	+0.7405	.5738	+1.070	9.4471	.9823
23	Rumk. 1243	8	+90	+17	5 55.7	- 2 23 56	+0.7700	.5739	+1.066	9.4470	.9823
23	Rumk. 1246	7	+30	-32	6 23.9	- 1 56 48	-0.1136	.5743	+1.058	9.4697	.9802
23	Rumk. 1247		+81	+ 8	6 24.2	- 1 56 29	+0.6182	.5743	+1.058	9.4521	.9818
23	Rumk. 1254		+88	+12	6 40.6	- 1 40 37	+0.6705	.5745	+1.054	9.4514	.9819
23	Lal. 8852	9½	+39	-22	7 0.9	- 1 21 6	+0.0499	.5748	+1.048	9.4674	.9804
23	Rumk. 1276		-24	-72	8 46.0	+ 0 20 11	-0.9975	.5761	+1.019	9.4957	.9776
23	B.A.C. 1478	7½	-41	-72	9 25.6	+ 0 58 23	-1.1776	.5766	+1.007	9.5012	.9770
23	Rumk. 1283	7	+90	+32	9 28.2	+ 1 0 53	+0.9824	.5766	+1.005	9.4508	.9820
23	$\epsilon$ Tauri	5½	-43	-72	10 34.3	+ 2 4 33	-1.1921	.5775	+0.989	9.5040	.9767
23	Rumk. 1300		+40	-20	10 50.7	+ 2 20 23	+0.0755	.5777	+0.984	9.4760	.9796
23	Rumk. 1301	6	-40	-72	10 51.6	+ 2 21 17	-1.1628	.5777	+0.984	9.5040	.9767
23	Rumk. 1302	7	-30	-72	10 52.2	+ 2 21 51	-1.0710	.5777	+0.984	9.5020	.9769
23	B.A.C. 1526	6	+90	+19	13 9.8	+ 4 34 27	+0.7807	.5792	+0.946	9.4646	.9807
23	$m$ Tauri	5½	+13	-48	17 20.4	+ 8 35 52	-0.4063	.5822	+0.873	9.5007	.9770
23	B.A.C. 1631	6½	-43	-71	22 57.8	- 9 59 20	-1.1855	.5865	+0.767	9.5272	.9739
24	115 Tauri	5½	+90	+28	1 34.3	- 7 28 43	+0.8819	.5883	+0.715	9.4864	.9786
24	119 Tauri	5½	+59	- 2	3 37.7	- 5 30 2	+0.3627	.5898	+0.675	9.5013	.9770
24	120 Tauri	6	+67	+ 3	4 10.1	- 4 58 53	+0.4496	.5901	+0.667	9.5002	.9771
24	$\chi^1$ Orionis	4½	-17	-70	12 35.4	+ 3 7 7	-0.8978	.5957	+0.491	9.5391	.9723
24	$\chi^2$ Orionis	6	+16	-40	12 49.1	+ 3 20 16	-0.3511	.5958	+0.488	9.5282	.9738
24	$\chi^3$ Orionis	5	+27	-28	16 13.7	+ 6 36 52	+0.1639	.5977	+0.417	9.5275	.9739
24	$\chi^4$ Orionis	5	+ 1	-59	16 24.1	+ 6 46 56	-0.6116	.5980	+0.409	9.5369	.9726
24	68 Orionis	6	+27	-27	19 38.1	+ 9 53 17	-0.1633	.5995	+0.340	9.5302	.9735
24	71 Orionis	5½	+70	+ 9	20 46.5	+10 59 0	+0.4995	.6002	+0.315	9.5169	.9751
25	15 <sup>a</sup> Geminor.	8	-29	-69	1 49.6	- 8 9 56	-1.0438	.6026	+0.203	9.5515	.9706
25	15 <sup>b</sup> Geminor.	6	-30	-69	1 50.0	- 8 9 30	-1.0517	.6026	+0.203	9.5517	.9705
25	16 Geminor.	6	- 8	-70	1 54.4	- 8 5 19	-0.7523	.6026	+0.202	9.5457	.9714
25	$\nu$ Geminor.	4½	+10	-45	2 18.6	- 7 42 1	-0.4632	.6026	+0.195	9.5400	.9722
25	$\zeta$ Gemin., mul.	4	-16	-70	15 59.1	+ 5 25 30	-0.8784	.6083	-0.122	9.5495	.9709
25	56 Geminor.	5½	-21	-70	22 51.9	-11 58 26	-0.9449	.6101	-0.285	9.5481	.9711
25	B.A.C. 2432	6½	+90	+59	23 20.7	-11 30 48	+1.1970	.6101	-0.293	9.5020	.9769
26	$g$ Geminor.	5½	+74	+10	8 10.6	- 3 2 30	+0.5373	.6115	-0.502	9.5088	.9761
26	85 Geminor.	6½	-29	-70	11 47.9	+ 0 25 58	-1.0469	.6118	-0.589	9.5387	.9723
26	B.A.C. 2683	6	+21	-36	15 18.0	+ 3 47 25	-0.2609	.6118	-0.666	9.5172	.9751
26	$\epsilon^1$ Cancri	4½	+90	+17	18 9.5	+ 6 31 55	+0.6942	.6118	-0.732	9.4909	.9781
26	$\epsilon^2$ Cancri	7½	+90	+17	18 10.4	+ 6 32 47	+0.6961	.6118	-0.733	9.4908	.9781
26	$\delta$ Cancri	6	+17	-43	22 26.4	+10 38 18	-0.3415	.6112	-0.833	9.5071	.9763
26	$\delta^2$ Cancri	6	+90	+24	23 25.0	+11 34 34	+0.8333	.6112	-0.855	9.4775	.9795
27	$\theta$ Cancri	6	+13	-47	1 36.2	-10 19 37	-0.4024	.6109	-0.901	9.5022	.9769
27	$\delta$ Cancri	4	-23	-72	6 38.1	- 5 30 2	-0.9788	.6100	-1.009	9.5045	.9766
27	$\alpha^2$ Cancri	6	+90	+33	11 39.0	- 0 41 20	+0.9975	.6090	-1.115	9.4424	.9827
27	$\pi^1$ Cancri	6½	+90	+23	17 23.7	+ 4 49 29	+0.8738	.6072	-1.230	9.4275	.9839
27	$\pi^2$ Cancri	6	+90	+16	18 30.6	+ 5 53 40	+0.7739	0.6067	-1.251	9.4264	9.9838

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Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	x'	y'	Log sin $\delta$	Log cos $\delta$
Jan. 28	7 Leonis, <i>mul.</i>	6½	+49	-16	2 35.6	-10 20 44	+0.2154	0.6941	-1.400	9.4119	9.9850
28	v Leonis	5	+90	+13	11 26.8	-1 50 33	+0.7677	.6102	-1.548	9.3543	.9886
28	a Leonis	1½	+76	+1	15 30.7	+2 3 54	+0.5798	.5984	-1.609	9.3388	.9894
28	34 Leonis	6	-23	-76	16 47.4	+3 17 36	-0.9949	.5980	-1.627	9.3836	.9869
29	l Leonis	5	-17	-79	8 5.0	-6 0 10	-0.9253	.5902	-1.818	9.2897	.9916
29	γ Leonis	5	+90	+25	14 37.8	+0 17 55	+1.0055	.5868	-1.884	9.1458	.9957
29	B.A.C. 3837	6½	+13	-63	18 21.4	+3 53 9	-0.4256	.5849	-1.915	9.1834	.9949
29	σ Leonis	4	+90	+24	21 20.9	+6 45 58	+1.0009	.5836	-1.939	9.0699	.9970
30	B.A.C. 3996	6	+7	-69	9 11.9	-5 49 7	-0.5272	.5780	-2.010	9.0135	.9977
30	β Virginis	6	+39	-32	13 50.4	-1 20 40	+0.0591	.5747	-2.029	8.8833	.9987
30	10 Virginis	6	+90	+18	18 2.3	+2 42 8	+0.9458	.5741	-2.043	8.6620	.9995
Feb. 1	65 Virginis	6	+86	+40	2 28.7	+10 0 20	+1.2131	.5629	-2.013	8.8686	.9988
1	80 Virginis	6	+77	-2	7 57.2	-8 42 25	+0.6170	.5613	-1.988	8.9161	.9985
2	ζ Libræ	6	+79	+9	19 38.8	+1 46 27	+0.7927	.5573	-1.698	8.92045	.9914
2	ζ Libræ	6	+38	-30	20 44.3	+2 49 46	+0.1074	.5574	-1.686	8.92758	.9921
2	18 Libræ, <i>mul.</i>	6½	+14	-56	21 43.3	+3 46 45	-0.3315	.5574	-1.675	8.92653	.9925
3	B.A.C. 5070	6	-16	-90	9 5.0	-9 14 31	-0.8279	.5574	-1.542	8.93142	.9906
3	γ Libræ	4½	+76	+19	14 20.7	-4 9 32	+0.9410	.5574	-1.475	8.93942	.9862
4	48 Libræ	4½	-29	-90	0 41.3	+5 50 8	-0.9847	.5578	-1.330	8.93805	.9871
4	49 Libræ	5½	+74	+50	1 39.3	+6 46 11	+1.2534	.5578	-1.317	8.94441	.9825
4	φ Ophiuchi	5	+13	-51	15 38.0	-3 43 25	-0.2496	.5585	-1.105	8.94488	.9821
4	24 Scorpii	5	+55	-9	20 20.8	+0 49 47	+0.4812	.5587	-1.033	8.94777	.9795
5	B.A.C. 5695	6	-44	-90	2 55.9	+7 11 29	-1.1140	.5590	-0.923	8.94557	.9815
5	20 Ophiuchi	6	+72	+16	5 32.0	+9 42 16	+0.8892	.5592	-0.877	8.95057	.9765
5	B.A.C. 5771	6½	-16	-90	8 28.0	-11 27 44	-0.7021	.5592	-0.828	8.94765	.9796
5	B.A.C. 5839	6½	-31	-90	13 45.0	-6 21 26	-0.9243	.5594	-0.739	8.94809	.9791
6	B.A.C. 6060	6½	-17	-88	6 6.1	+9 26 27	-0.6575	.5595	-0.452	8.95076	.9763
6	B.A.C. 6081	6½	+70	+21	7 55.5	+11 12 4	+0.9415	.5594	-0.419	8.95408	.9721
6	15 Sagittarii	5	+69	+42	14 51.0	-6 6 29	+1.1698	.5590	-0.293	8.95496	.9708
6	16 Sagittarii	6	+70	+11	14 51.7	-6 5 44	+0.8004	.5590	-0.293	8.95427	.9718
6	21 Sagittarii	5	+70	+17	19 29.2	-1 37 39	+0.8863	.5586	-0.208	8.95465	.9713
6	B.A.C. 6287	6	-51	-90	21 44.8	+0 33 27	-1.1122	.5583	-0.163	8.95084	.9762
6	B.A.C. 6292	6	-36	-90	22 16.1	+1 3 38	-0.9245	.5583	-0.165	8.95124	.9757
7	29 Sagittarii	6	+57	-1	6 38.6	+9 9 18	+0.6182	.5574	-0.007	8.95437	.9717
7	ζ Sagittarii	6	+69	+27	10 10.1	-11 26 17	+1.0133	.5569	+0.054	8.95508	.9707
7	B.A.C. 6536	6	-5	-61	15 15.3	-6 31 18	-0.3890	.5563	+0.145	8.95233	.9743
7	δ Sagittarii	5	-18	-86	19 35.9	-2 19 22	-0.6479	.5553	+0.225	8.95167	.9752
8	B.A.C. 6658	6	-52	-90	0 28.4	+2 23 24	-1.1340	.5541	+0.310	8.95042	.9767
8	f Sagittarii	5	+70	+10	8 59.9	+10 38 4	+0.7845	.5525	+0.455	8.95355	.9728
8	57 Sagittarii	5½	+29	-27	11 45.1	-10 42 8	+0.1502	.5518	+0.503	8.95208	.9747
9	σ Capricor.	5½	+71	+34	0 38.8	+1 46 28	+1.1015	.5483	+0.714	8.95240	.9743
9	π Capricor.	5	+47	-13	4 27.7	+5 28 1	+0.4083	.5470	+0.774	8.95046	.9766
9	ρ Capri., <i>mult.</i>	5	+25	-34	5 12.7	+6 11 30	+0.0318	.5470	+0.783	8.94957	.9776
9	B.A.C. 7043	6½	+2	-60	5 16.6	+6 15 16	-0.3820	.5469	+0.784	8.94869	.9785
9	ο Capri., <i>mult.</i>	6	+71	+19	5 41.5	+6 39 23	+0.9185	.5466	+0.792	8.95129	.9756
9	B.A.C. 7097	6	-44	-90	8 26.6	+9 19 11	-1.1084	.5456	+0.835	8.94653	.9807
9	v Capricor.	5½	+72	+15	10 35.8	+11 24 16	+0.8666	.5451	+0.867	8.95037	.9767
12	h Aquarii	6	-7	-90	12 8.4	+10 43 12	-0.7263	.5218	+1.675	8.91646	.9953
12	h Aquarii	7	-2	-82	12 13.6	+10 48 14	-0.6454	.5218	+1.676	8.91677	.9952
12	h Aquarii	7	+12	-63	12 31.3	+11 5 29	-0.3923	.5217	+1.679	8.91769	.9950
12	h Aquarii	7½	+4	-72	13 13.4	+11 46 22	-0.5456	.5216	+1.683	8.91646	.9953
12	γ Aquarii	5½	+56	-16	18 19.6	-7 16 19	+0.3674	.5204	+1.715	8.91667	.9953
13	27 Piscium	5½	+19	-54	16 39.3	-9 34 48	-0.3007	.5165	+1.820	8.8735	.9988
13	29 Piscium	5½	+4	-74	18 20.5	-7 56 31	-0.5715	.5164	+1.825	8.8166	.9991
14	B.A.C. 81	6½	+75	+7	6 31.1	+3 53 24	+0.7622	.5156	+1.855	8.7118	.9994

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.											
Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta$	Log cos $\delta$
Feb. 14	14 Ceti	6½	+34	-38	12 26.4	+ 9 38 39	-0.0327	0.5155	+1864	8.3311	9.9999
14	15 Ceti	6½	+49	-24	13 48.8	+10 58 43	+0.2212	.5155	+1865	8.3304	9.9999
15	26 Ceti, <i>mult.</i>	6½	+89	+ 3	3 35.1	+ 0 21 36	+0.7047	.5164	+1867	8.0624	0.0000
15	29 Ceti	6½	+61	-14	5 48.6	+ 2 31 19	+0.4089	.5168	+1865	8.3575	9.9999
15	33 Ceti	6	+46	-26	7 11.2	+ 3 51 34	+0.1789	.5168	+1864	8.4839	.9998
15	35 Ceti	6½	+57	-17	8 14.4	+ 4 52 54	+0.3410	.5169	+1863	8.4914	.9998
15	f Piscium	6	+14	-60	11 2.1	+ 7 35 53	-0.4015	.5174	+1859	8.7074	.9994
15	B.A.C. 408	6½	-35	-86	13 38.3	+10 7 34	-1.1612	.5178	+1854	8.8490	.9989
15	v Piscium	4½	+26	-46	23 30.9	- 4 16 49	-0.1866	.5199	+1829	8.9245	.9985
16	64 Ceti	6½	- 9	-82	15 4.7	+10 49 40	-0.8123	.5243	+1767	9.1411	.9958
16	f Ceti	4½	-20	-82	15 54.8	+11 38 19	-0.9652	.5247	+1763	9.1557	.9955
16	B.A.C. 741	6½	-15	-81	21 47.8	- 6 39 12	-0.9045	.5270	+1731	9.1909	.9945
16	g Ceti	4	+90	+10	23 40.8	- 4 49 32	+0.7800	.5278	+1719	9.1364	.9959
17	B.A.C. 830	6	+ 8	-65	6 53.8	+ 2 10 24	-0.5069	.5308	+1672	9.2473	.9931
17	$\mu$ Ceti	5	+59	-13	8 7.3	+ 3 21 36	+0.3714	.5314	+1663	9.2202	.9939
17	B.A.C. 987	6½	- 6	-71	21 11.3	- 7 58 33	-0.7570	.5379	+1557	9.3369	.9895
18	f Tauri	4	+90	+11	6 38.4	+ 1 10 39	+0.7415	.5434	+1463	9.3348	.9896
18	Wei. III. 1005	8½	+75	+ 3	22 18.8	- 7 39 33	+0.5642	.5528	+1282	9.4034	.9856
19	Wei. IV. 24	9	+90	+11	1 17.6	- 4 46 45	+0.6968	.5547	+1243	9.4099	.9852
19	Lal. 7753	7½	+33	-30	1 22.9	- 4 41 35	-0.0459	.5549	+1241	9.4296	.9837
19	B.A.C. 1281	7	- 9	-74	1 25.9	- 4 38 44	-0.7834	.5549	+1241	9.4482	.9822
19	Rumk. 1103	7	+55	-11	1 30.2	- 4 34 32	+0.3071	.5550	+1240	9.4209	.9844
19	Rumk. 1108	9	+90	+39	1 59.6	- 4 6 8	+1.0985	.5553	+1233	9.4013	.9857
19	Rumk. 1123	8½	+90	+55	2 52.7	- 3 14 51	+1.2442	.5559	+1220	9.4003	.9858
19	48 Tauri	6	+90	+17	3 36.7	- 2 32 17	+0.7919	.5564	+1211	9.4149	.9848
19	$\gamma$ Tauri	4	+90	+15	5 26.5	- 0 46 15	+0.7575	.5576	+1185	9.4216	.9843
19	55 Tauri	7	+26	-28	5 28.6	- 0 44 11	-0.1865	.5576	+1185	9.4457	.9824
19	Rumk. 1161	4	-47	-73	6 9.4	- 0 4 46	-1.2246	.5581	+1175	9.4723	.9800
19	Rumk. 1163	8	+13	-51	6 12.9	- 0 1 23	-0.4035	.5582	+1174	9.4531	.9818
19	$\delta$ Tauri	4	-34	-73	6 49.5	+ 0 34 0	-1.1146	.5586	+1166	9.4716	.9801
19	63 Tauri	6	+20	-43	7 3.8	+ 0 47 45	-0.2804	.5587	+1163	9.4525	.9815
19	B.A.C. 1351	6	+29	-33	7 5.4	+ 0 49 18	-0.1206	.5589	+1162	9.4487	.9821
19	$\delta$ Tauri	6	-20	-73	7 21.2	+ 1 4 37	-0.9526	.5591	+1158	9.4693	.9803
19	Lal. 8249	7½	+ 5	-62	7 28.9	+ 1 12 3	-0.5539	.5592	+1156	9.4602	.9811
19	Lal. 8256	8	+17	-47	7 31.7	+ 1 14 45	-0.3432	.5592	+1156	9.4554	.9815
19	70 Tauri	7	+90	+13	8 4.8	+ 1 46 42	+0.7155	.5595	+1148	9.4306	.9836
19	Lal. 8311	8	+90	+48	8 17.9	+ 1 59 21	+1.1771	.5597	+1145	9.4193	.9845
19	Rumk. 1188	6½	+90	+48	8 18.1	+ 1 59 34	+1.1787	.5597	+1145	9.4192	.9845
19	Rumk. 1189	6	+24	-39	8 24.7	+ 2 5 56	-0.2135	.5597	+1143	9.4546	.9816
19	71 Tauri	6	+90	+39	8 24.8	+ 2 6 4	+1.0922	.5597	+1143	9.4219	.9843
19	Rumk. 1192	6	+ 7	-59	8 27.9	+ 2 9 0	-0.5253	.5598	+1142	9.4623	.9809
19	Rumk. 1198	6	+90	+54	8 45.2	+ 2 25 44	+1.2306	.5599	+1138	9.4192	.9845
19	Rumk. 1200	6	+90	+48	8 58.7	+ 2 38 44	+1.1822	.5601	+1135	9.4211	.9844
19	Rumk. 1203	6	+67	- 1	9 18.2	+ 2 57 39	+0.4659	.5601	+1130	9.4404	.9828
19	75 Tauri	6	+62	- 4	9 21.0	+ 3 0 20	+0.4102	.5601	+1129	9.4420	.9827
19	$\theta$ Tauri	4½	+90	+20	9 24.7	+ 3 3 54	+0.8343	.5602	+1129	9.4314	.9836
19	$\theta$ Tauri	4½	+90	+27	9 27.3	+ 3 6 25	+0.9356	.5602	+1128	9.4290	.9837
19	Rumk. 1210	6	+84	+ 9	9 35.6	+ 3 14 27	+0.6454	.5603	+1126	9.4368	.9831
19	Rumk. 1212	6	-10	-73	9 43.3	+ 3 21 49	-0.8039	.5604	+1124	9.4721	.9800
19	Rumk. 1214	6	-36	-73	9 47.2	+ 3 25 40	-1.1319	.5605	+1123	9.4798	.9793
19	Rumk. 1215	7	-39	-73	9 47.8	+ 3 26 12	-1.1631	.5605	+1123	9.4805	.9792
19	80 Tauri, <i>mul.</i>	6	+90	+58	10 7.6	+ 3 45 22	+1.2520	.5606	+1119	9.4227	.9842
19	B.A.C. 1391	5	+90	+12	10 18.1	+ 3 55 29	+0.6831	.5609	+1116	9.4378	.9831
19	81 Tauri	5½	+90	+53	10 21.3	+ 3 58 34	+1.2184	.5610	+1115	9.4243	.9841
19	B.A.C. 1394	7	+90	+15	10 24.2	+ 4 1 22	+0.7362	0.5610	+1114	9.4368	9.9831

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.							
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$		
1869.			<sup>o</sup>	<sup>o</sup>	<sup>h</sup> <sup>m</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>							
Feb. 19	Rumk. 1227	7	+90	+42	10 40.3	+ 4 16 57	+1.1207	0.5611	+1110	9.4277	9.9838		
19	85 Tauri	6	+90	+41	10 53.7	+ 4 29 51	+1.1061	.5612	+1107	9.4287	.9838		
19	Rumk. 1232		+57	- 7	11 6.7	+ 4 42 23	+0.3403	.5613	+1103	9.4485	.9821		
19	Rumk. 1233		-23	-73	11 13.1	+ 4 48 35	-0.9829	.5614	+1101	9.4800	.9792		
19	Rumk. 1234		+90	+31	11 19.5	+ 4 54 47	+0.9872	.5615	+1100	9.4330	.9835		
19	B.A.C. 1406	7	+90	+12	11 41.2	+ 5 15 44	+0.6896	.5617	+1094	9.4415	.9827		
19	Rumk. 1238	10	+72	+ 3	12 3.2	+ 5 36 58	+0.5306	.5620	+1090	9.4465	.9823		
19	Lal. 8599	9	- 6	-72	12 7.5	+ 5 41 9	-0.7355	.5620	+1088	9.4775	.9795		
19	Lal. 8610	8	+38	-24	12 16.3	+ 5 49 34	+0.0361	.5621	+1085	9.4590	.9812		
19	Lal. 8613	8	+26	-36	12 17.7	+ 5 50 55	-0.1745	.5621	+1085	9.4641	.9808		
19	$\alpha$ Tauri	1	+78	+ 6	12 42.2	+ 6 14 37	+0.5907	.5625	+1079	9.4467	.9823		
19	89 Tauri	7	+45	-18	13 42.9	+ 7 13 11	+0.1460	.5632	+1063	9.4601	.9811		
19	Rumk. 1241		+90	+18	14 28.8	+ 7 57 31	+0.7598	.5636	+1052	9.4471	.9823		
19	Rumk. 1243	8	+90	+19	14 42.6	+ 8 10 48	+0.7901	.5638	+1047	9.4470	.9823		
19	Rumk. 1246	7	+30	-31	15 11.7	+ 8 38 54	-0.1067	.5642	+1038	9.4697	.9802		
19	Rumk. 1247		+84	+10	15 12.0	+ 8 39 13	+0.6359	.5642	+1038	9.4521	.9818		
19	Rumk. 1254		+90	+13	15 29.0	+ 8 55 36	+0.6891	.5645	+1032	9.4514	.9819		
19	Lal. 8852	9½	+39	-22	15 49.9	+ 9 14 49	+0.0594	.5648	+1025	9.4674	.9804		
19	Rumk. 1276		-25	-72	17 38.5	+11 0 36	-1.0039	.5655	+1009	9.4957	.9776		
19	B.A.C. 1478	7½	-43	-72	18 19.4	+11 40 10	-1.1866	.5660	+0996	9.5012	.9770		
19	Rumk. 1283	7	+90	+33	18 22.1	+11 42 42	+1.0060	.5661	+0995	9.4508	.9820		
19	$\epsilon$ Tauri	5½	-45	-72	19 30.4	-11 11 23	-1.2009	.5670	+0972	9.5047	.9767		
19	Rumk. 1300		+41	-20	19 47.4	-10 54 59	+0.0858	.5673	+0966	9.4767	.9796		
19	Rumk. 1301	6	-41	-72	19 48.3	-10 54 3	-1.1708	.5673	+0966	9.5040	.9767		
19	Rumk. 1302	7	-31	-72	19 48.9	-10 53 31	-1.0777	.5674	+0968	9.5020	.9769		
19	B.A.C. 1526	6	+90	+21	22 11.2	- 8 36 16	+0.8022	.5690	+0931	9.4645	.9807		
20	$m$ Tauri	5½	+13	-47	2 30.3	- 4 26 21	-0.4023	.5720	+0853	9.5006	.9770		
20	B.A.C. 1651	6½	-45	-71	8 19.0	+ 1 9 52	-1.1929	.5756	+0755	9.5272	.9739		
20	115 Tauri	5½	+90	+30	11 0.9	+ 3 45 49	+0.9053	.5776	+0705	9.4864	.9786		
20	119 Tauri	5½	+60	- 1	13 8.4	+ 5 48 42	+0.3790	.5789	+0666	9.5013	.9770		
20	120 Tauri	6	+67	+ 4	13 41.8	+ 6 20 56	+0.4670	.5793	+0653	9.5002	.9771		
20	$\chi^1$ Orionis	4½	-18	-70	22 24.1	- 9 16 14	-0.8995	.5849	+0482	9.5391	.9723		
20	$\chi^2$ Orionis	6	+16	-40	22 38.2	- 9 2 35	-0.3449	.5852	+0479	9.5282	.9738		
21	$\chi^3$ Orionis	5	+27	-28	2 9.4	- 5 39 18	-0.1548	.5871	+0410	9.5275	.9739		
21	$\chi^4$ Orionis	5	+ 1	-59	2 20.2	- 5 28 55	-0.6090	.5871	+0407	9.5369	.9726		
21	68 Orionis	6	+27	-27	5 40.4	- 2 16 17	-0.1541	.5891	+0335	9.5302	.9735		
21	71 Orionis	5½	+72	+10	6 51.0	- 1 8 27	+0.5171	.5897	+0311	9.5169	.9751		
21	15 <sup>i</sup> Geminor.	8	-29	-69	12 3.5	+ 3 52 7	-1.0462	.5922	+0201	9.5515	.9706		
21	15 <sup>a</sup> Geminor.	6	-30	-69	12 3.9	+ 3 52 33	-1.0541	.5922	+0201	9.5517	.9705		
21	16 Geminor.	6	- 8	-70	12 8.4	+ 3 56 53	-0.7508	.5924	+0200	9.5457	.9714		
21	$\nu$ Geminor.	4½	+10	-45	12 33.5	+ 4 20 56	-0.4579	.5928	+0184	9.5400	.9722		
22	$\zeta$ Gemin., <i>mul.</i>	4	-16	-70	2 37.4	- 6 7 54	-0.8776	.5992	-0123	9.5495	.9709		
22	56 Geminor.	5½	-21	-70	9 40.9	+ 0 38 47	-0.9443	.6017	-0283	9.5481	.9711		
22	B.A.C. 2432	6½	+90	+26	10 10.4	+ 1 7 8	+0.7905	.6019	-0291	9.5020	.9769		
22	$g$ Geminor.	5½	+75	+11	19 12.2	+ 9 47 22	+0.5512	.6044	-0497	9.5088	.9761		
22	85 Geminor.	6½	-29	-70	22 53.9	-10 39 50	-1.0462	.6051	-0582	9.5387	.9723		
23	B.A.C. 2683	6	+22	-36	2 27.8	- 7 14 30	-0.2544	.6056	-0666	9.5172	.9751		
23	$\zeta^1$ Cancri	4½	+90	+17	5 23.0	- 4 26 19	+0.7060	.6059	-0732	9.4909	.9781		
23	$\zeta^2$ Cancri	7½	+90	+17	5 23.1	- 4 26 13	+0.7086	.6059	-0732	9.4908	.9781		
23	$d^1$ Cancri	6	+17	-42	9 43.0	- 0 16 44	-0.3363	.6063	-0826	9.5071	.9763		
23	$d^2$ Cancri	6	+90	+25	10 42.5	+ 0 40 19	+0.8451	.6063	-0848	9.4775	.9795		
23	$\theta$ Cancri	6	+14	-47	12 55.4	+ 2 47 54	-0.3980	.6064	-0895	9.5022	.9769		
23	$\delta$ Cancri	4	-23	-72	18 0.7	+ 7 40 56	-0.9772	.6063	-1004	9.5045	.9766		
23	$\sigma^1$ Cancri	6	+90	+63	22 56.7	-11 35 1	+1.2744	.6062	-1108	9.4356	.9832		
23	$\sigma^2$ Cancri	6	+90	+33	23 4.3	-11 27 41	+1.0046	0.6062	-1109	9.4424	9.9827		

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta$	Log cos $\delta$
Feb. 24	$\pi^1$ Cancri	6 $\frac{1}{2}$	+90	+23	h m s 4 51.1	- 5 54 45	+0.8782	0.6055	-1.227	9.4275	9.9839
24	$\pi^2$ Cancri	6	+90	+17	5 58.3	- 4 50 19	+0.7779	.6055	-1.248	9.4263	.9839
24	7 Leonis, <i>mul.</i>	6 $\frac{1}{2}$	+49	-16	14 4.1	+ 2 56 7	+0.2154	.6040	-1.400	9.4119	.9850
24	$\nu$ Leonis	5	+90	+13	22 53.8	+11 24 46	+0.7624	.6017	-1.553	9.3543	.9886
25	$\alpha$ Leonis	1 $\frac{1}{2}$	+76	+ 1	2 56.2	- 8 42 21	+0.5731	.6006	-1.617	9.3388	.9894
25	34 Leonis	6	-22	-76	4 12.3	- 7 29 13	-0.9956	.6003	-1.634	9.3836	.9869
25	l Leonis	5	-17	-79	19 18.8	+ 6 58 3	-0.9296	.5954	-1.837	9.2897	.9916
26	$\chi$ Leonis	5	+90	+21	1 44.9	-10 46 47	+0.9829	.5931	-1.908	9.1457	.9957
26	B.A.C. 3837	6 $\frac{1}{2}$	+12	-61	5 24.0	- 7 16 1	-0.4370	.5914	-1.944	9.1834	.9949
26	$\sigma$ Leonis	4	+90	+22	8 19.6	- 4 27 3	+0.9736	.5906	-1.966	9.0698	.9970
26	B.A.C. 3996	6	+ 6	-70	19 53.3	+ 6 40 29	-0.5432	.5865	-2.045	9.0134	.9977
27	b Virginia	6	+38	-33	0 24.2	+11 1 17	+0.0334	.5847	-2.067	8.8832	.9987
27	10 Virginia	6	+90	+16	4 28.7	- 9 3 16	+0.9053	.5832	-2.081	8.6619	.9995
28	65 Virginia	6	+86	+34	11 49.6	- 2 50 44	+1.1508	.5744	-2.058	8.8688	.9988
28	66 Virginia	6	+86	+49	12 21.0	- 2 20 32	+1.2826	.5741	-2.056	8.8926	.9987
28	80 Virginia	6	+73	- 5	17 6.1	+ 2 14 24	+0.5627	.5731	-2.033	8.9162	.9985
Mar. 2	$\xi^1$ Libræ	6	+79	+ 4	3 29.9	+11 25 20	+0.7216	.5677	-1.732	8.9245	.9914
2	$\xi^2$ Libræ	6	+35	-33	4 33.2	-11 33 36	+0.0473	.5675	-1.718	8.92759	.9921
2	18 Libræ, <i>mul.</i>	6 $\frac{1}{2}$	+11	-60	5 30.2	-10 38 36	-0.3845	.5672	-1.706	8.92654	.9925
2	B.A.C. 5070	6	-19	-90	16 29.5	- 0 2 23	-0.8768	.5664	-1.566	8.93143	.9906
2	$\gamma$ Libræ	4 $\frac{1}{2}$	+76	+14	21 35.3	+ 4 52 47	+0.8638	.5661	-1.497	8.93942	.9862
3	$\eta$ Libræ	6	+75	+48	1 21.5	+ 8 31 5	+1.2442	.5668	-1.448	8.94201	.9844
3	48 Libræ	4 $\frac{1}{2}$	-33	-90	7 38.0	- 9 25 36	-1.0356	.5652	-1.349	8.93805	.9871
3	49 Libræ	5 $\frac{1}{2}$	+74	+39	8 34.4	- 8 31 10	+1.1708	.5652	-1.334	8.94441	.9825
3	$\phi$ Ophiuchi	5	+ 9	-55	22 12.2	+ 4 38 14	-0.3137	.5644	-1.122	8.94488	.9821
4	B.A.C. 5579	5	+50	-13	2 48.7	+ 9 5 11	+0.4080	.5643	-1.041	8.94778	.9795
4	B.A.C. 5695	6	-49	-90	9 15.9	- 8 41 4	-1.1705	.5638	-0.935	8.94557	.9815
4	29 Ophiuchi	6	+71	+11	11 49.1	- 6 13 10	+0.8121	.5635	-0.885	8.95057	.9765
4	B.A.C. 5771	6 $\frac{1}{2}$	-19	-90	14 41.9	- 3 26 17	-0.7633	.5631	-0.834	8.94766	.9796
4	B.A.C. 5839	6 $\frac{1}{2}$	-35	-90	19 53.9	+ 1 34 52	-0.9838	.5626	-0.744	8.94809	.9791
5	B.A.C. 6060	6 $\frac{1}{2}$	-21	-90	12 2.7	- 6 49 37	-0.7196	.5606	-0.442	8.95076	.9763
5	B.A.C. 6081	6 $\frac{1}{2}$	+70	+16	13 50.9	- 5 5 4	+0.8636	.5606	-0.418	8.95408	.9721
5	B.A.C. 6098	6	+70	+63	15 1.2	- 3 57 9	+1.2578	.5603	-0.400	8.95490	.9709
5	15 Sagittarii	5	+69	+34	20 43.0	+ 1 32 57	+1.0975	.5597	-0.290	8.95496	.9708
5	16 Sagittarii	6	+69	+ 6	20 43.8	+ 1 33 42	+0.7302	.5597	-0.290	8.95427	.9718
6	21 Sagittarii	5	+69	+12	1 19.4	+ 5 59 56	+0.8170	.5589	-0.212	8.95465	.9713
6	B.A.C. 6287	6	-57	-90	3 34.3	+ 8 10 17	-1.1714	.5584	-0.163	8.95084	.9762
6	B.A.C. 6292	6	-41	-90	4 5.4	+ 8 40 20	-0.9840	.5582	-0.159	8.95124	.9757
6	29 Sagittarii	6	+51	- 4	12 26.0	- 7 15 59	+0.5538	.5567	-0.005	8.95437	.9717
6	$\xi^1$ Sagittarii	6	+69	+22	15 57.0	- 3 52 5	+0.9482	.5555	+0.058	8.95508	.9707
6	B.A.C. 6536	6	+ 8	-66	21 1.7	+ 1 2 28	-0.4477	.5546	+0.148	8.95233	.9744
7	d Sagittarii	5	-22	-90	1 22.2	+ 5 14 20	-0.7044	.5538	+0.231	8.95166	.9752
7	B.A.C. 6658	6	-58	-90	6 14.9	+ 9 57 15	-1.1885	.5526	+0.309	8.95042	.9766
7	f Sagittarii	5	+70	+ 6	14 47.2	- 5 47 13	+0.7300	.5504	+0.459	8.95355	.9728
7	57 Sagittarii	5 $\frac{1}{2}$	+25	-32	17 32.9	- 3 6 55	+0.0980	.5495	+0.508	8.95208	.9747
8	$\sigma$ Capricor.	5 $\frac{1}{2}$	+70	+30	6 29.4	+ 9 24 28	+1.0553	.5470	+0.718	8.95240	.9743
8	$\pi$ Capricor.	5	+44	-15	10 19.2	-10 53 6	+0.3643	.5442	+0.771	8.95046	.9766
8	$\rho$ Capri., <i>mult.</i>	5	+22	-37	11 4.3	-10 9 27	-0.0115	.5441	+0.784	8.94956	.9776
8	B.A.C. 7043	6 $\frac{1}{2}$	0	-64	11 8.2	-10 5 40	-0.4252	.5441	+0.785	8.94868	.9785
8	$\alpha$ Capri., <i>mult.</i>	6	+71	+16	11 33.3	- 9 41 26	+0.8756	.5441	+0.796	8.95129	.9756
8	B.A.C. 7097	6	-48	-90	14 19.1	- 7 0 52	-1.1500	.5432	+0.832	8.94653	.9837
8	$\nu$ Capricor.	5 $\frac{1}{2}$	+72	+12	16 28.4	- 4 55 11	+0.8266	.5426	+0.871	8.95037	.9767
8	B.A.C. 7209	6 $\frac{1}{2}$	+72	+38	21 0.5	- 0 32 12	+1.1468	.5409	+0.933	8.95019	.9769
8	19 Capricor.	6	+71	+69	23 41.3	+ 2 3 34	+1.2921	.5404	+0.974	8.94996	.9772
9	21 Capricor.	6	+72	+41	2 40.3	+ 4 56 58	+1.1722	0.5395	+1.016	8.94909	9.9781



## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	x'	y'	Log sin $\delta$	Log cos $\delta$
Mar. 9	$\theta$ Capricor.	4	+72	+34	5 10.5	+ 7 21 30	+1.1117	0.5386	+1.047	n9.4841	9.9788
9	29 Capricor.	6	- 7	-81	10 4.2	-11 52 54	-0.6141	.5363	+1.127	n9.4327	.9835
9	42 Capricor.	6	+14	-52	23 1.0	+ 0 40 6	-0.2657	.5330	+1.277	n9.4024	.9857
9	44 Capricor.	6	+42	-23	23 46.4	+ 1 24 8	+0.2393	.5330	+1.287	n9.4130	.9849
10	45 Capricor.	6	+74	+ 3	0 14.8	+ 1 51 37	+0.6923	.5325	+1.290	n9.4228	.9842
10	MERCURY										
10	$\mu$ Capricor.	5	-35	-90	4 34.5	+ 6 3 34	-1.0935	.5006	+1.326	n9.3597	.9883
10	$\mu$ Aquarii	4	+29	-36	4 55.5	+ 6 23 52	-0.0028	.5310	+1.346	n9.3888	.9866
10	$\epsilon^2$ Aquarii	6	+76	+59	11 39.8	-11 3 55	+1.3020	.5293	+1.420	n9.3987	.9859
10	$\epsilon^3$ Aquarii	6	-23	-90	13 50.7	- 8 56 57	-0.9389	.5289	+1.442	n9.3252	.9901
10	42 Aquarii	6	+77	+19	17 0.4	- 5 52 57	+0.9397	.5274	+1.473	n9.3677	.9879
11	$\sigma$ Aquarii	4½	+12	-58	0 11.6	+ 1 5 35	-0.3514	.5256	+1.530	n9.2939	.9914
11	58 Aquarii	6	+31	-37	0 43.7	+ 1 36 40	-0.0151	.5256	+1.546	n9.3025	.9911
11	64 Aquarii	6½	+13	-58	4 41.5	+ 5 27 29	-0.3597	.5249	+1.581	n9.2691	.9924
11	VENUS		+ 2	-72	5 58.7	+ 6 42 27	-0.5437	.4745	+1.384	n9.2550	.9929
14	26 Ceti, mult.	6½	+90	+ 8	9 34.6	+ 8 8 33	+0.7902	.5182	+1.841	8.0618	0.0000
14	29 Ceti	6½	+63	- 9	11 47.7	+10 17 51	+0.4965	.5183	+1.882	8.3572	9.9999
14	33 Ceti	6	+52	-21	13 10.1	+11 37 51	+0.2678	.5186	+1.880	8.4837	.9998
14	35 Ceti	6½	+63	-12	14 13.1	-11 20 57	+0.4311	.5187	+1.879	8.4913	.9998
14	$f$ Piscium	6	+19	-54	17 0.3	- 8 38 29	-0.3093	.5194	+1.876	8.7073	.9994
14	B.A.C. 408	6½	-27	-86	19 36.0	- 6 7 15	-1.0671	.5196	+1.871	8.8489	.9989
15	$\nu$ Piscium	4½	+31	-40	5 27.4	+ 3 27 1	-0.0831	.5216	+1.844	8.9245	.9985
15	64 Ceti	6½	- 2	-82	21 0.5	- 5 27 6	-0.6974	.5257	+1.780	9.1410	.9958
15	$\epsilon^1$ Ceti	4½	-12	-82	21 50.7	- 4 38 25	-0.8500	.5258	+1.775	9.1557	.9955
16	B.A.C. 741	6½	- 8	-81	3 44.1	+ 1 4 32	-0.7848	.5273	+1.741	9.1999	.9945
16	$\epsilon^2$ Ceti	4	+90	+18	5 37.4	+ 2 54 26	+0.9067	.5281	+1.728	9.1364	.9959
16	B.A.C. 830	6	+15	-66	12 51.7	+ 9 55 43	-0.3795	.5307	+1.680	9.2473	.9931
16	$\mu$ Ceti	5	+69	- 6	14 5.5	+11 7 14	+0.5002	.5318	+1.671	9.2202	.9939
17	B.A.C. 987	6½	+ 2	-72	3 14.0	- 0 8 21	-0.6219	.5368	+1.562	9.3369	.9895
17	$f$ Tauri	4	+90	+20	12 46.3	+ 9 5 59	+0.8902	.5407	+1.464	9.3348	.9896
18	Wei. III. 1085	8½	+90	+12	4 38.8	+ 0 27 54	+0.7191	.5491	+1.276	9.4033	.9856
18	Wei. IV. 24	9	+90	+21	7 40.4	+ 3 23 34	+0.8541	.5505	+1.236	9.4099	.9852
18	Lal. 7753	7½	+42	-22	7 45.9	+ 3 28 52	+0.1043	.5505	+1.236	9.4296	.9837
18	B.A.C. 1281	7	0	-69	7 48.9	+ 3 31 45	-0.6404	.5505	+1.235	9.4482	.9822
18	Rumk. 1103	7	+68	- 1	7 53.3	+ 3 36 0	+0.4876	.5514	+1.234	9.4209	.9844
18	Rumk. 1108	9	+90	+48	8 23.1	+ 4 4 51	+1.2595	.5512	+1.228	9.4013	.9858
18	Rumk. 1110		-48	-73	8 28.6	+ 4 10 11	-1.2377	.5512	+1.223	9.4643	.9808
18	48 Tauri	6	+90	+27	10 1.9	+ 5 40 23	+0.9508	.5521	+1.205	9.4149	.9848
18	Rumk. 1136	6	+44	-20	10 30.3	+ 6 7 51	+0.1332	.5524	+1.199	9.4373	.9831
18	$\gamma$ Tauri	4	+90	+26	11 53.6	+ 7 28 22	+0.9173	.5531	+1.179	9.4216	.9843
18	55 Tauri	7	+34	-29	11 55.7	+ 7 30 26	-0.0367	.5531	+1.179	9.4457	.9824
18	Rumk. 1161		-31	-73	12 37.2	+ 8 10 36	-1.0857	.5535	+1.169	9.4723	.9800
18	Rumk. 1163	8	+22	-41	12 40.8	+ 8 14 3	-0.2559	.5536	+1.168	9.4531	.9818
18	$\delta^1$ Tauri	4½	-22	-73	13 18.1	+ 8 50 7	-0.9746	.5539	+1.160	9.4716	.9801
18	63 Tauri	6	+28	-34	13 32.6	+ 9 4 6	-0.1314	.5540	+1.156	9.4525	.9818
18	B.A.C. 1351	6½	+38	-25	13 34.2	+ 9 5 41	+0.0301	.5541	+1.156	9.4487	.9821
18	$\delta^2$ Tauri	6	-11	-73	13 50.4	+ 9 21 20	-0.8106	.5541	+1.152	9.4693	.9803
18	Lal. 8249	7½	+13	-51	13 58.2	+ 9 28 54	-0.4075	.5541	+1.151	9.4603	.9811
18	Lal. 8256	8	+25	-38	14 1.1	+ 9 31 39	-0.1948	.5541	+1.150	9.4553	.9816
18	$\delta^3$ Tauri	5	-53	-73	14 28.3	+ 9 57 59	-1.2595	.5544	+1.141	9.4811	.9791
18	70 Tauri	7	+90	+23	14 34.8	+10 4 13	+0.8754	.5545	+1.140	9.4306	.9836
18	Rumk. 1189		+32	-30	14 55.1	+10 23 50	-0.0634	.5547	+1.137	9.4546	.9816
18	71 Tauri	6	+90	+58	14 55.2	+10 23 57	+1.2563	.5547	+1.137	9.4218	.9843
18	Rumk. 1192		+14	-49	14 58.3	+10 26 55	-0.3785	.5547	+1.137	9.4623	.9809
18	Rumk. 1203		+82	+ 8	15 49.6	+11 16 33	+0.6236	.5553	+1.124	9.4404	.9828
18	75 Tauri	6	+76	+ 5	15 52.4	+11 19 17	+0.5672	.5553	+1.123	9.4420	9.9827

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta'$	Log cos $\delta'$
Mar. 18	$\theta^1$ Tauri	4 $\frac{1}{2}$	+90	+32	15 56.2	h m s	+0.9961	0.5554	+1.123	9.4314	9.9836
18	$\theta^2$ Tauri	4 $\frac{1}{2}$	+90	+40	15 58.8	+11 25 28	+1.0935	.5554	+1.122	9.4289	.9838
18	Rumk. 1210		+90	+19	16 7.4	+11 33 43	+0.8048	.5555	+1.120	9.4367	.9831
18	Rumk. 1212	6	-1	-69	16 15.1	+11 41 12	-0.6601	.5555	+1.118	9.4721	.9800
18	Rumk. 1214		-23	-73	16 19.1	+11 45 3	-0.9915	.5555	+1.117	9.4798	.9793
18	Rumk. 1215	7	-26	-73	16 19.7	+11 45 39	-1.0231	.5555	+1.117	9.4801	.9792
18	B.A.C. 1391	5	+90	+21	16 50.6	-11 44 29	+0.8433	.5558	+1.109	9.4378	.9831
18	B.A.C. 1394	7	+90	+25	16 56.8	-11 38 28	+0.8972	.5559	+1.107	9.4367	.9831
18	Rumk. 1227	7	+90	+65	17 13.3	-11 22 35	+1.2862	.5560	+1.103	9.4277	.9838
18	85 Tauri	6	+90	+61	17 26.9	-11 9 24	+1.2709	.5561	+1.099	9.4287	.9838
18	Rumk. 1232		+69	+1	17 40.1	-10 56 37	+0.4968	.5562	+1.097	9.4486	.9822
18	Rumk. 1233		-12	-73	17 46.7	-10 50 17	-0.8377	.5563	+1.095	9.4800	.9792
18	Rumk. 1234		+90	+45	17 53.2	-10 43 58	+1.1513	.5563	+1.093	9.4329	.9834
18	B.A.C. 1406	7	+90	+22	18 15.3	-10 22 36	+0.8502	.5565	+1.088	9.4414	.9828
18	Rumk. 1238	10	+90	+12	18 37.8	-10 0 55	+0.6895	.5567	+1.082	9.4464	.9823
18	Lal. 8599	9	+1	-66	18 42.2	-9 56 39	-0.6258	.5568	+1.080	9.4775	.9795
18	Lal. 8610	8	+47	-16	18 51.1	-9 48 3	+0.1818	.5569	+1.079	9.4590	.9812
18	Lal. 8613	8	+35	-27	18 52.5	-9 46 39	-0.0232	.5569	+1.079	9.4641	.9808
18	$\alpha$ Tauri	1	+90	+16	19 17.5	-9 22 30	+0.7502	.5571	+1.074	9.4466	.9823
18	89 Tauri	7	+55	-9	20 19.4	-8 22 41	+0.3009	.5577	+1.059	9.4601	.9811
18	Rumk. 1241		+90	+27	21 6.3	-7 37 22	+0.9222	.5580	+1.046	9.4471	.9823
18	Rumk. 1243	8	+90	+29	21 20.4	-7 23 47	+0.9528	.5583	+1.043	9.4468	.9823
18	Rumk. 1246	7	+39	-23	21 50.1	-6 55 3	+0.0458	.5586	+1.034	9.4697	.9802
18	Rumk. 1247		+90	+19	21 50.5	-6 54 44	+0.7969	.5586	+1.034	9.4520	.9819
18	Rumk. 1254		+90	+23	22 7.8	-6 38 1	+0.8505	.5588	+1.030	9.4514	.9819
18	Lal. 8852	9 $\frac{1}{2}$	+49	-14	22 29.1	-6 17 22	+0.2136	.5590	+1.023	9.4674	.9805
18	Rumk. 1269	6 $\frac{1}{2}$	-48	-72	23 51.6	-4 57 43	-1.2377	.5598	+1.002	9.5027	.9768
18	B.A.C. 1468	6	-40	-72	23 56.7	-4 52 48	-1.1620	.5598	+1.001	9.5013	.9770
19	Rumk. 1276		-14	-72	0 20.1	-4 30 13	-0.8618	.5600	+0.995	9.4957	.9776
19	B.A.C. 1478	7 $\frac{1}{2}$	-28	-72	1 01.9	-3 49 47	-1.0466	.5605	+0.984	9.5012	.9770
19	Rumk. 1283	7	+90	+49	1 4.7	-3 47 9	+1.1722	.5605	+0.983	9.4508	.9820
19	$\epsilon$ Tauri	5 $\frac{1}{2}$	-30	-72	2 14.5	-2 39 42	-1.0612	.5610	+0.965	9.5040	.9767
19	Rumk. 1300		+51	-11	2 31.8	-2 22 57	+0.2409	.5612	+0.960	9.4760	.9796
19	Rumk. 1301	6	-27	-72	2 32.8	-2 22 1	-1.0313	.5612	+0.960	9.5040	.9767
19	B.A.C. 1302	7	-20	-72	2 33.4	-2 21 25	-0.9369	.5612	+0.960	9.5020	.9769
19	B.A.C. 1526	6	+90	+32	4 58.9	-0 0 54	+0.9668	.5630	+0.921	9.4645	.9807
19	$\pi$ Tauri	5 $\frac{1}{2}$	+22	-38	9 24.2	+4 15 13	-0.2533	.5648	+0.844	9.5007	.9770
19	B.A.C. 1651	6 $\frac{1}{2}$	-30	-70	15 22.0	+10 0 26	-1.0551	.5682	+0.742	9.5272	.9739
19	115 Tauri	5 $\frac{1}{2}$	+90	+42	18 8.1	-11 19 17	+1.0723	.5699	+0.713	9.4863	.9786
19	119 Tauri	5 $\frac{1}{2}$	+74	+8	20 19.2	-9 12 55	+0.5378	.5710	+0.657	9.5013	.9770
19	120 Tauri	6	+85	+14	20 53.5	-8 39 45	+0.6272	.5715	+0.645	9.5002	.9771
20	$\chi^1$ Orionis	4 $\frac{1}{2}$	-8	-70	5 51.1	-0 1 31	-0.7612	.5751	+0.475	9.5391	.9723
20	$\chi^2$ Orionis	6	+25	-31	6 5.6	+0 12 31	-0.1982	.5759	+0.472	9.5282	.9738
20	$\chi^3$ Orionis	5	+26	-19	9 43.6	+3 42 22	-0.0063	.5772	+0.399	9.5275	.9739
20	$\chi^4$ Orionis	5	+9	-47	9 54.5	+3 53 5	-0.4673	.5780	+0.397	9.5369	.9726
20	68 Orionis	6	+26	-18	13 21.1	+7 12 4	-0.0068	.5791	+0.330	9.5301	.9735
20	71 Orionis	5 $\frac{1}{2}$	+90	+20	14 33.9	+8 22 15	+0.6755	.5797	+0.302	9.5169	.9751
20	15 $\frac{1}{2}$ Geminor.	8	-19	-69	19 56.7	-10 26 53	-0.9158	.5826	+0.194	9.5515	.9706
20	15 $\frac{3}{4}$ Geminor.	6	-20	-69	19 57.2	-10 26 26	-0.9241	.5826	+0.194	9.5517	.9705
20	16 Geminor.	6	+1	-58	20 1.9	-10 21 55	-0.6158	.5826	+0.193	9.5457	.9714
20	$\nu$ Geminor.	4 $\frac{1}{2}$	+18	-35	20 27.7	-9 57 3	-0.3183	.5822	+0.181	9.5400	.9722
21	$\zeta$ Gemin., mul.	4	-8	-69	11 0.9	+4 3 25	-0.7523	.5882	-0.124	9.5495	.9708
21	56 Geminor.	5 $\frac{1}{2}$	-12	-69	18 19.5	+11 5 16	-0.8245	.5901	-0.280	9.5481	.9711
22	$g$ Geminor.	5 $\frac{1}{2}$	+90	+18	4 11.4	-3 25 28	+0.6893	.5926	-0.0495	9.5088	.9761
22	85 Geminor.	6 $\frac{1}{2}$	-20	-70	8 1.1	+0 15 23	-0.9383	0.5936	-0.0579	9.5387	9.9724

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	x'	y'	Log sin δ'	Log cos δ'
Mar. 22	B.A.C. 2683	6	+28	-29	11 42.7	+ 3 48 25	-0.1361	0.5939	-0.6660	9.5172	9.9751
22	γ <sup>1</sup> Cancri	5½	+90	+25	14 44.2	+ 6 42 52	+0.8371	.5943	-0.725	9.4909	.9781
22	γ <sup>2</sup> Cancri	7½	+90	+26	14 44.3	+ 6 42 57	+0.8399	.5943	-0.725	9.4908	.9781
22	d <sup>1</sup> Cancri	6	+23	-35	19 13.4	+11 1 37	-0.2263	.5948	-0.817	9.5071	.9763
22	d <sup>2</sup> Cancri	6	+90	+34	20 14.9	-11 59 14	+0.9734	.5948	-0.818	9.4775	.9795
22	θ Cancri	6	+20	-40	22 32.4	- 9 47 3	-0.2918	.5950	-0.890	9.5022	.9769
22	B.A.C. 2854	6½	-43	-71	22 33.5	- 9 46 2	-1.1904	.5950	-0.890	9.5219	.9745
23	δ Cancri	4	-16	-72	3 48.1	- 4 43 35	-0.8857	.5953	-0.997	9.5045	.9766
23	σ <sup>2</sup> Cancri	6	+90	+43	9 1.7	+ 0 17 51	+1.1200	.5953	-1.102	9.4425	.9827
23	π <sup>1</sup> Cancri	6½	+90	+31	14 59.6	+ 6 1 47	+0.9840	.5953	-1.218	9.4275	.9839
23	π <sup>2</sup> Cancri	6	+90	+23	16 8.8	+ 7 8 21	+0.8808	.5953	-1.239	9.4264	.9839
24	7 Leonis, mul.	6½	+54	-12	0 28.9	- 8 50 54	+0.2994	.5946	-1.395	9.4118	.9850
24	ν Leonis	5	+90	+17	9 32.7	- 0 8 6	+0.8399	.5936	-1.548	9.3543	.9886
24	α Leonis	1½	+83	+ 5	13 41.0	+ 3 50 38	+0.6421	.5932	-1.613	9.3389	.9894
24	34 Leonis	6	-19	-76	14 58.8	+ 5 5 31	-0.9448	.5928	-1.631	9.3836	.9869
25	ι Leonis	5	-15	-79	6 22.8	- 4 5 42	-0.8997	.5899	-1.841	9.2897	.9916
25	χ Leonis	5	+90	+25	12 54.4	+ 2 11 0	+1.0137	.5887	-1.912	9.1458	.9957
25	σ Leonis	4	+90	+23	19 33.5	+ 8 35 4	+0.9915	.5876	-1.975	9.0698	.9970
26	B.A.C. 3996	6	+ 6	-71	7 11.4	- 4 13 4	-0.5507	.5851	-2.060	9.0134	.9977
26	b Virginis	6	+37	-34	11 42.9	+ 0 8 15	+0.0183	.5845	-2.084	8.8832	.9987
26	10 Virginis	6	+90	+14	15 46.9	+ 4 3 15	+0.8841	.5839	-2.101	8.6618	.9995
27	γ Virgin., mul.	2½	+90	+57	5 16.1	- 6 57 27	+1.3292	.5816	-2.128	n8.1068	0.0000
27	B.A.C. 4277	6	+90	+48	6 3.5	- 6 11 46	+1.2815	.5816	-2.128	n8.1737	0.0000
27	65 Virginis	6	+86	+26	22 50.9	+ 9 58 48	+1.0627	.5795	-2.094	n8.8638	9.9988
27	66 Virginis	6	+86	+38	23 21.7	+10 28 30	+1.1923	.5795	-2.094	n8.8926	.9987
28	80 Virginis	6	+65	-11	4 1.8	- 9 1 42	+0.4692	.5791	-2.071	n8.9162	.9985
28	94 Virginis	6	+82	+59	17 5.7	+ 3 33 46	+1.3277	.5780	-1.984	n9.1577	.9955
29	ξ <sup>1</sup> Libræ	6	+69	- 4	13 34.2	- 0 42 17	+0.5722	.5769	-1.774	n9.2945	.9914
29	ξ <sup>2</sup> Libræ	6	+27	-41	14 35.6	+ 0 16 53	-0.0946	.5770	-1.761	n9.2759	.9921
29	18 Libræ, mul.	6½	+ 4	-70	15 30.9	+ 1 10 9	-0.5219	.5769	-1.750	n9.2654	.9925
30	B.A.C. 5070	6	-29	-90	2 9.7	+11 25 50	-1.0200	.5763	-1.609	n9.3143	.9906
30	γ Libræ	4½	+75	+ 2	7 5.7	- 7 48 51	+0.6900	.5761	-1.537	n9.3942	.9862
30	η Libræ	6	+75	+23	10 44.5	- 4 17 59	+1.0607	.5759	-1.480	n9.4201	.9844
30	48 Libræ	4½	-47	-90	16 48.5	+ 1 32 56	-1.1918	.5757	-1.385	n9.3806	.9871
30	49 Libræ	5½	+74	+22	17 43.1	+ 2 25 31	+0.9812	.5757	-1.370	n9.4441	.9825
31	φ Ophiuchi	5	- 1	-69	6 53.9	- 8 52 10	-0.4921	.5744	-1.146	n9.4488	.9821
31	24 Scorpii	5	+38	-24	11 21.5	- 4 34 14	+0.2171	.5738	-1.064	n9.4778	.9795
31	29 Ophiuchi	6	+63	- 2	20 4.6	+ 3 50 6	+0.6988	.5731	-0.910	n9.5057	.9765
31	B.A.C. 5771	6½	-31	-90	22 52.0	+ 6 31 34	-0.9454	.5723	-0.854	n9.4766	.9796
Apr. 1	B.A.C. 5839	6½	-51	-90	3 54.4	+11 23 10	-1.1655	.5714	-0.759	n9.4809	.9791
1	B.A.C. 6060	6½	-33	-90	19 35.6	+ 2 30 56	-0.9114	.5684	-0.457	n9.5076	.9762
1	B.A.C. 6081	6½	+63	+ 2	21 20.9	+ 4 12 37	+0.6564	.5678	-0.427	n9.5408	.9721
1	B.A.C. 6098	6	+69	+29	22 29.4	+ 5 18 40	+1.0409	.5676	-0.400	n9.5490	.9709
2	μ <sup>1</sup> Sagittarii	4	+69	+55	3 23.6	+10 2 31	+1.2477	.5662	-0.306	n9.5561	.9699
2	15 Sagittarii	5	+69	+16	4 2.5	+10 40 7	+0.8822	.5659	-0.296	n9.5496	.9708
2	16 Sagittarii	6	+51	- 6	4 3.3	+10 40 50	+0.5192	.5659	-0.296	n9.5427	.9718
2	21 Sagittarii	5	+57	- 1	8 32.3	- 8 59 34	+0.6047	.5649	-0.208	n9.5465	.9713
2	B.A.C. 6292	6	-57	-90	11 14.5	- 6 23 0	-1.1750	.5640	-0.159	n9.5124	.9757
2	B.A.C. 6347	6½	+69	+35	14 33.8	- 3 10 34	+1.1046	.5632	-0.093	n9.5574	.9697
2	29 Sagittarii	6	+36	-16	19 24.3	+ 1 29 52	+0.3453	.5624	-0.001	n9.5437	.9717
2	ξ <sup>1</sup> Sagittarii	6	+69	+ 7	22 51.1	+ 4 49 37	+0.7364	.5606	+0.062	n9.5508	.9707
2	ξ <sup>2</sup> Sagittarii	4	+69	+51	23 0.7	+ 4 58 54	+1.2235	.5602	+0.064	n9.5597	.9693
3	B.A.C. 6536	6	-19	-86	3 50.2	+ 9 38 31	-0.6451	.5590	+0.154	n9.5233	.9744
3	B.A.C. 6539	6	+69	+45	3 55.5	+ 9 43 16	+1.1885	.5581	+0.155	n9.5580	.9696
3	π Sagittarii	3	+69	+54	4 28.0	+10 15 0	+1.2391	0.5581	+0.167	n9.5588	9.9695

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Washing- ton Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$y'$	Log sin $\delta$	Log cos $\delta$
Apr. 3	$\delta$ Sagittarii	5	-34	-90	h m s	h m s	-0.8989	0.5571	+0.0231	$\alpha$ 9.5166	9.9752
3	$f$ Sagittarii	5	+53	-6	21 19.6	+2 32 36	+0.5284	.5524	+0.0464	$\alpha$ 9.5355	.9728
4	57 Sagittarii	5½	+15	-42	0 3.2	+5 10 52	-0.0976	.5511	+0.0512	$\alpha$ 9.5208	.9747
4	$\sigma$ Capricor.	5½	+71	-14	12 51.9	-6 25 40	+0.8608	.5461	+0.0724	$\alpha$ 9.5240	.9743
4	$\pi$ Capricor.	5	+33	-26	16 39.9	-2 44 57	+0.1770	.5451	+0.0748	$\alpha$ 9.5046	.9766
4	$\rho$ Capri., mult.	5	+12	-48	17 24.7	-2 1 37	-0.1963	.5448	+0.0797	$\alpha$ 9.4956	.9776
4	B.A.C. 7043	6½	-10	-81	17 28.6	-1 57 52	-0.6078	.5448	+0.0797	$\alpha$ 9.4868	.9785
4	$\sigma$ Capri., mult.	6	+69	+3	17 53.4	-1 33 50	+0.6861	.5442	+0.0802	$\alpha$ 9.5129	.9756
4	$\nu$ Capricor.	5½	+66	0	22 47.2	+3 10 33	+0.6413	.5429	+0.0678	$\alpha$ 9.5036	.9767
5	B.A.C. 7202	6	+71	+33	2 50.1	+7 5 44	+1.1000	.5413	+0.0937	$\alpha$ 9.5055	.9765
5	B.A.C. 7209	6½	+72	+22	3 17.3	+7 32 6	+0.9645	.5408	+0.0941	$\alpha$ 9.5018	.9769
5	19 Capricor.	6	+72	+34	5 57.3	+10 7 5	+1.1112	.5394	+0.0982	$\alpha$ 9.4996	.9772
5	21 Capricor.	6	+72	+24	8 55.7	-11 0 11	+0.9945	.5383	+0.1023	$\alpha$ 9.4909	.9781
5	$\theta$ Capricor.	4	+72	+19	11 25.4	-8 35 7	+0.9369	.5376	+0.1061	$\alpha$ 9.4841	.9788
5	29 Capricor.	6	-17	-90	16 18.3	-3 51 21	-0.7776	.5357	+0.1123	$\alpha$ 9.4327	.9835
6	42 Capricor.	6	+6	-63	5 14.2	+8 40 48	-0.4166	.5313	+0.1285	$\alpha$ 9.4024	.9857
6	44 Capricor.	6	+33	-31	5 59.6	+9 24 48	+0.0878	.5308	+0.1295	$\alpha$ 9.4129	.9849
6	45 Capricor.	6	+62	-6	6 27.9	+9 52 15	+0.5403	.5308	+0.1302	$\alpha$ 9.4228	.9842
6	$\mu$ Capricor.	5	+21	-45	11 9.8	-9 34 22	-0.1474	.5293	+0.1354	$\alpha$ 9.3887	.9866
6	$\epsilon$ Aquarii	4	+76	+37	17 53.4	-3 2 54	+1.1636	.5271	+0.1428	$\alpha$ 9.3967	.9859
6	$\alpha$ Aquarii	6	-33	-90	20 4.4	-0 55 47	-1.0700	.5264	+0.1450	$\alpha$ 9.3252	.9901
6	42 Aquarii	6	+77	+10	23 14.3	+2 8 28	+0.8093	.5255	+0.1481	$\alpha$ 9.3676	.9879
7	$\sigma$ Aquarii	4½	+6	-66	6 26.2	+9 7 38	-0.4690	.5240	+0.1551	$\alpha$ 9.2939	.9914
7	58 Aquarii	6	+25	-54	6 58.3	+9 38 47	-0.1327	.5236	+0.1555	$\alpha$ 9.3024	.9911
7	64 Aquarii	6½	+7	-66	10 56.5	-9 29 59	-0.4710	.5225	+0.1591	$\alpha$ 9.2691	.9924
7	70 Aquarii	6	+79	+15	15 46.0	-5 49 0	+0.9040	.5218	+0.1631	$\alpha$ 9.2901	.9916
8	$k^1$ Aquarii	6	-10	-90	0 33.3	+2 43 1	-0.7950	.5200	+0.1697	$\alpha$ 9.1646	.9953
8	$k^2$ Aquarii	7	-6	-90	0 38.5	+2 48 4	-0.7137	.5200	+0.1698	$\alpha$ 9.1677	.9952
8	$k^3$ Aquarii	7	+9	-65	0 56.2	+3 5 20	-0.4602	.5199	+0.1699	$\alpha$ 9.1769	.9950
8	$k^4$ Aquarii	7½	0	-79	1 38.4	+3 46 18	-0.6113	.5199	+0.1705	$\alpha$ 9.1646	.9953
8	$\chi$ Aquarii	5½	+53	-19	6 45.0	+8 44 1	+0.3143	.5193	+0.1739	$\alpha$ 9.1666	.9953
9	27 Piscium	5½	+20	-53	5 3.5	+6 24 16	-0.2824	.5170	+0.1851	$\alpha$ 8.8735	.9988
9	29 Piscium	5½	+6	-73	6 44.3	+8 2 14	-0.5546	.5170	+0.1858	$\alpha$ 8.8166	.9991
9	B.A.C. 81	6½	+87	+9	18 51.9	-4 10 52	+0.8198	.5172	+0.1892	$\alpha$ 8.7108	.9994
10	14 Ceti	6½	+38	-34	0 45.3	+1 32 27	+0.0377	.5175	+0.1901	$\alpha$ 8.3312	.9999
10	15 Ceti	6½	+54	-20	2 7.1	+2 52 1	+0.2951	.5176	+0.1903	$\alpha$ 8.3305	.9999
12	$\epsilon$ Ceti	4	+90	+25	11 33.1	+10 37 35	+1.0202	.5310	+0.1757	9.1364	.9959
12	B.A.C. 830	6	+23	-48	18 44.0	-6 24 38	-0.2499	.5335	+0.1707	9.2473	.9931
12	$\mu$ Ceti	5	+81	+2	19 57.1	-5 13 43	+0.6331	.5348	+0.1698	9.2202	.9939
13	B.A.C. 987	6½	+10	-69	8 59.5	+7 24 30	-0.4678	.5401	+0.1586	9.3369	.9895
13	$f$ Tauri	4	+90	+32	18 27.6	-7 25 16	+1.0573	.5441	+0.1487	9.3347	.9896
14	Wei. III. 1085	8½	+90	+24	10 14.7	+7 51 13	+0.9088	.5514	+0.1297	9.4033	.9856
14	Lal. 7702	9½	-31	-73	12 36.1	+10 7 57	-1.0950	.5526	+0.1265	9.4612	.9810
14	Wei. IV. 24	9	+90	+34	13 15.6	+10 46 6	+1.0483	.5529	+0.1256	9.4094	.9852
14	Lal. 7753	7½	+55	-11	13 21.0	+10 51 20	+0.2980	.5530	+0.1256	9.4296	.9837
14	B.A.C. 1281	7	+11	-54	13 23.9	+10 54 13	-0.4472	.5530	+0.1254	9.4482	.9822
14	Rumk. 1103	7	+86	+8	13 28.3	+10 58 27	+0.6548	.5530	+0.1253	9.4209	.9844
14	Rumk. 1110	7	-27	-73	14 3.6	+11 32 31	-1.0440	.5533	+0.1245	9.4643	.9807
14	48 Tauri	6	+90	+44	15 36.5	-10 57 39	+1.1484	.5541	+0.1224	9.4149	.9848
14	Rumk. 1136	6	+57	-9	16 4.8	-10 30 16	+0.3303	.5543	+0.1217	9.4373	.9831
14	$\gamma$ Tauri	4	+90	+41	17 27.8	-9 10 2	+1.1163	.5550	+0.1197	9.4216	.9843
14	55 Tauri	7	+46	-18	17 29.9	-9 7 57	+0.1618	.5550	+0.1197	9.4456	.9824
14	Rumk. 1161	8	-15	-73	18 11.3	-8 27 57	-0.8876	.5553	+0.1187	9.4723	.9800
14	Rumk. 1163	8	+33	-30	18 14.9	-8 24 31	-0.0568	.5554	+0.1186	9.4531	.9818
15	$\delta^1$ Tauri	4	-8	-73	18 52.1	-7 48 33	-0.7752	.5557	+0.1177	9.4716	9.9801

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Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.						
			North- ern.	South- ern.		H	Y	x'	y'	L <sup>g</sup> sin δ'	Log cos δ'	
Apr. 14	63 Tauri	6	+40	-23	19 6.5	- 7 34 35	+0.0639	0.5558	+1.174	9.4525	9.9818	
14	B.A.C. 1351	6½	+50	-14	19 8.2	- 7 33 0	+0.2306	.5558	+1.173	9.4487	.9821	
14	δ <sup>2</sup> Tauri	6	+ 2	-66	19 24.3	- 7 17 26	-0.6110	.5559	+1.170	9.4693	.9803	
14	Lal. 8249	7½	+25	-38	19 32.1	- 7 9 52	-0.2072	.5560	+1.168	9.4602	.9811	
14	Lal. 8256	8	+36	-26	19 34.9	- 7 7 9	+0.0059	.5560	+1.167	9.4553	.9816	
14	δ <sup>3</sup> Tauri	5	-29	-73	20 2.1	- 6 40 50	-1.0597	.5562	+1.169	9.4811	.9791	
14	70 Tauri	7	+90	+38	20 8.5	- 6 34 38	+1.0785	.5563	+1.159	9.4306	.9836	
14	Rumk. 1189		+44	-19	20 28.7	- 6 15 7	+1.1386	.5565	+1.154	9.4547	.9816	
14	Rumk. 1192		+26	-36	20 32.0	- 6 12 1	-0.1770	.5565	+1.153	9.4622	.9809	
14	Rumk. 1203		+90	+20	21 23.2	- 5 22 30	+0.8273	.5569	+1.140	9.4404	.9828	
14	75 Tauri	6	+90	+17	21 26.0	- 5 19 47	+0.7711	.5569	+1.139	9.4420	.9827	
14	θ <sup>1</sup> Tauri	4½	+90	+50	21 29.7	- 5 16 9	+1.2006	.5569	+1.138	9.4314	.9836	
14	Rumk. 1210		+90	+33	21 40.9	- 5 5 25	+1.0095	.5571	+1.136	9.4368	.9831	
14	Rumk. 1212	6	+11	-54	21 48.6	- 4 57 56	-0.4577	.5571	+1.133	9.4721	.9800	
14	Rumk. 1214		- 9	-73	21 52.6	- 4 54 3	-0.7894	.5571	+1.133	9.4798	.9793	
14	Rumk. 1215	7	-11	-73	21 53.2	- 4 53 28	-0.8212	.5571	+1.133	9.4805	.9792	
14	B.A.C. 1391	5	+90	+36	22 24.0	- 4 23 41	+1.0491	.5574	+1.125	9.4378	.9831	
14	B.A.C. 1394	7	+90	+40	22 30.4	- 4 17 30	+1.1031	.5574	+1.123	9.4367	.9831	
14	Rumk. 1232		+90	+13	23 13.5	- 3 35 55	+0.7026	.5577	+1.112	9.4486	.9822	
14	Rumk. 1233		0	-68	23 20.0	- 3 29 36	-0.6342	.5578	+1.110	9.4800	.9792	
14	B.A.C. 1406	7	+90	+37	23 48.6	- 3 1 57	+1.0573	.5580	+1.103	9.4414	.9827	
15	Rumk. 1238	10	+90	+25	0 11.0	- 2 40 19	+0.8966	.5581	+1.097	9.4464	.9823	
15	Lal. 8599	9	+13	-51	0 15.4	- 2 36 3	-0.4208	.5582	+1.096	9.4775	.9795	
15	Lal. 8610	8	+61	- 4	0 24.3	- 2 27 28	+0.3964	.5582	+1.094	9.4590	.9812	
15	Lal. 8613	8	+47	-16	0 25.7	- 2 26 6	+0.1830	.5582	+1.093	9.4641	.9808	
15	α Tauri	1	+90	+29	0 50.7	- 2 1 56	+0.9587	.5584	+1.087	9.4467	.9823	
15	Lal. 8678	8	-38	-72	1 23.8	- 1 29 59	-1.1500	.5587	+1.078	9.4963	.9775	
15	89 Tauri	7	+71	+ 2	1 52.5	- 1 2 13	+0.5092	.5589	+1.071	9.4601	.9811	
15	Rumk. 1241		+90	+44	2 39.4	- 0 16 59	+1.1327	.5592	+1.059	9.4471	.9823	
15	Rumk. 1243	8	+90	+47	2 53.4	- 0 3 24	+1.1636	.5595	+1.056	9.4470	.9823	
15	Rumk. 1246	7	+52	-11	3 23.1	+ 0 25 16	+0.2551	.5597	+1.048	9.4697	.9802	
15	Rumk. 1247		+90	+34	3 23.4	+ 0 25 36	+1.0081	.5597	+1.048	9.4520	.9819	
15	Rumk. 1251		-51	-72	3 32.4	+ 0 34 14	-1.2448	.5598	+1.046	9.5032	.9768	
15	Rumk. 1254		+90	+38	3 40.7	+ 0 42 19	+1.0624	.5599	+1.043	9.4514	.9819	
15	Rumk. 1258	6	-32	-72	3 56.5	+ 0 57 31	-1.0887	.5600	+1.039	9.5008	.9770	
15	Lal. 8852	9½	+64	- 2	4 2.1	+ 1 2 56	+0.4240	.5600	+1.038	9.4674	.9805	
15	Rumk. 1269	6½	+31	-30	5 24.5	+ 2 22 32	-1.0297	.5607	+1.016	9.5027	.9768	
15	B.A.C. 1468	6	-21	-72	5 29.6	+ 2 27 26	-0.9535	.5608	+1.015	9.5013	.9770	
15	Rumk. 1276		- 1	-67	5 53.0	+ 2 50 2	-0.6521	.5610	+1.008	9.4957	.9776	
15	B.A.C. 1478	7½	-13	-72	6 34.8	+ 3 30 26	-0.8371	.5613	+0.997	9.5012	.9777	
15	i Tauri	5½	-13	-72	7 47.4	+ 4 40 32	-0.8506	.5619	+0.978	9.5040	.9767	
15	Rumk. 1300		+66	+ 0	8 4.7	+ 4 57 17	+0.4555	.5620	+0.974	9.4760	.9796	
15	Rumk. 1301	6	-11	-72	8 5.7	+ 4 58 13	-0.8204	.5620	+0.974	9.5040	.9767	
15	Rumk. 1302	7	- 5	-72	8 6.3	+ 4 58 50	-0.7258	.5620	+0.974	9.5020	.9769	
15	B.A.C. 1526	6	+90	+51	10 31.9	+ 7 19 24	+1.1855	.5628	+0.931	9.4645	.9807	
15	m Tauri	5½	+34	-25	14 57.6	+11 35 58	-0.0341	.5654	+0.866	9.5007	.9771	
15	B.A.C. 1561	6½	-13	-70	20 56.4	- 6 37 45	-0.8349	.5601	+0.754	9.5272	.9739	
16	119 Tauri	5½	+90	+21	1 55.0	- 1 49 39	+0.7691	.5702	+0.663	9.5013	.9770	
16	120 Tauri	6	+90	+27	2 29.6	- 1 16 18	+0.8594	.5699	+0.650	9.5002	.9771	
16	B.A.C. 1733	6½	-43	-70	2 29.7	- 1 16 13	-1.1817	.5699	+0.650	9.5418	.9719	
16	χ <sup>1</sup> Orionis	4½	+ 6	-53	11 30.9	+ 7 25 44	-0.5320	.5736	+0.480	9.5392	.9723	
16	χ <sup>2</sup> Orionis	6	+38	-18	11 45.6	+ 7 39 55	+0.0348	.5736	+0.476	9.5282	.9738	
16	χ <sup>3</sup> Orionis	5	+50	- 6	15 25.5	+11 11 49	+0.2299	.5752	+0.403	9.5275	.9738	
16	χ <sup>4</sup> Orionis	5	+23	-32	15 36.7	+11 22 37	-0.2345	.5752	+0.400	9.5369	.9726	
16	68 Orionis	6	+50	- 6	19 5.4	- 9 16 9	+0.2311	0.5765	+0.333	9.5302	9.9735	

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.							
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$		
1869.													
Apr. 16	71 Orionis	5½	+90	+35	20 19.1	- 8 5 9	+0.9191	0.5768	+0.310	9.5169	9.9752		
17	15 <sup>1</sup> Geminor.	8	- 3	-65	1 46.0	- 2 50 11	-0.6832	.5780	+0.196	9.5515	.9706		
17	15 <sup>2</sup> Geminor.	6	- 4	-65	1 46.5	- 2 49 44	-0.6915	.5780	+0.196	9.5517	.9705		
17	16 Geminor.	6	+15	-40	1 51.2	- 2 45 11	-0.3807	.5780	+0.195	9.5457	.9714		
17	$\nu$ Geminor.	4½	+32	-21	2 17.4	- 2 19 56	-0.0808	.5786	+0.188	9.5400	.9722		
17	$\zeta$ Gemin., <i>mul.</i>	4	+ 7	-49	17 5.0	+11 54 57	-0.5177	.5824	-0.121	9.5495	.9708		
18	56 Geminor.	5½	+ 2	-56	0 32.5	+ 1 54 9	-0.5921	.5837	-0.281	9.5481	.9711		
18	$g$ Geminor.	5½	+90	+34	10 38.4	+ 4 48 59	+0.9389	.5848	-0.494	9.5088	.9761		
18	85 Geminor.	6½	- 5	-69	14 24.0	+ 8 35 44	-0.7115	.5852	-0.576	9.5387	.9724		
18	B.A.C. 2683	6	+42	-15	18 21.5	-11 45 14	+0.9999	.5853	-0.651	9.5172	.9751		
18	$\zeta^1$ Cancri	5½	+90	+44	21 28.0	- 8 45 44	+1.0859	.5855	-0.720	9.4909	.9781		
18	$\zeta^2$ Cancri	7½	+90	+44	21 28.1	- 8 45 37	+1.0884	.5855	-0.720	9.4908	.9781		
19	$d^1$ Cancri	6	+37	-22	2 5.0	- 4 19 10	+0.0046	.5854	-0.811	9.5071	.9763		
19	$d^2$ Cancri	6	+90	+57	3 8.4	- 3 18 10	+1.2210	.5854	-0.832	9.4775	.9795		
19	$\theta$ Cancri	6	+32	-27	5 30.0	- 1 1 50	-0.0647	.5853	-0.873	9.5022	.9769		
19	B.A.C. 2854	6½	-23	-71	5 31.1	- 1 0 46	-0.9767	.5853	-0.873	9.5219	.9745		
19	$\delta$ Cancri	4	- 2	-68	10 55.6	+ 4 11 29	-0.6709	.5852	-0.987	9.5045	.9766		
19	$\pi^1$ Cancri	6½	+90	+52	22 29.0	- 8 41 3	+1.2181	.5844	-1.208	9.4275	.9839		
19	$\pi^2$ Cancri	6	+90	+41	23 40.6	- 7 32 9	+1.1122	.5844	-1.229	9.4264	.9839		
20	7 Leonis, <i>mul.</i>	6½	+70	0	8 18.1	+ 0 45 58	+0.5124	.5834	-1.377	9.4119	.9850		
20	$\nu$ Leonis	5	+90	+32	17 41.0	+ 9 48 1	+1.0498	.5821	-1.532	9.3543	.9886		
20	$\alpha$ Leonis	1½	+90	+17	21 58.1	-10 4 22	+0.8424	.5813	-1.597	9.3389	.9894		
20	34 Leonis	6	- 7	-76	23 18.8	- 8 46 41	-0.7722	.5811	-1.614	9.3836	.9869		
21	$\iota$ Leonis	5	- 6	-75	15 15.3	+ 6 34 38	-0.7527	.5790	-1.823	9.2897	.9916		
21	$\chi$ Leonis	5	+90	+39	22 0.1	-10 55 21	+1.1768	.5778	-1.900	9.1458	.9957		
22	B.A.C. 3837	6½	+21	-51	1 49.1	- 7 14 40	-0.2859	.5777	-1.935	9.1834	.9949		
22	$\sigma$ Leonis	4	+90	+35	4 52.2	- 4 18 14	+1.1402	.5771	-1.962	9.0699	.9970		
22	B.A.C. 3996	6	+12	-63	16 51.4	+ 7 14 56	-0.4501	.5762	-2.051	9.0134	.9977		
22	$b$ Virginis	6	+43	-29	21 30.4	+11 43 54	+0.1154	.5758	-2.077	8.8832	.9987		
23	10 Virginis	6	+90	+20	1 41.4	- 8 14 13	+0.9800	.5757	-2.096	8.6618	.9995		
24	65 Virginis	6	+86	+27	9 21.3	- 1 42 38	+1.0757	.5758	-2.108	8.8688	.9988		
24	66 Virginis	6	+86	+39	9 52.5	- 1 12 35	+1.2050	.5759	-2.106	8.8927	.9987		
24	80 Virginis	6	+65	-11	14 35.6	+ 3 20 21	+0.4636	.5761	-2.086	8.9162	.9985		
25	94 Virginis	6	+82	+50	3 45.0	- 7 58 48	+1.2877	.5771	-2.005	8.91577	.9955		
26	$\xi^1$ Libræ	6	+62	-10	0 12.0	+11 43 40	+0.4772	.5792	-1.806	8.92945	.9914		
26	$\xi^2$ Libræ	6	+22	-48	1 13.0	-11 17 31	-0.1905	.5793	-1.795	8.92759	.9921		
26	18 Libræ, <i>mul.</i>	6½	- 1	-50	2 8.0	-10 24 38	-0.6193	.5794	-1.782	8.92654	.9925		
26	B.A.C. 5070	6	-38	-90	12 40.9	- 0 14 47	-1.1384	.5802	-1.642	8.93143	.9906		
26	$\gamma$ Libræ	4½	+65	- 6	17 33.2	+ 4 26 50	+0.5530	.5807	-1.569	8.93042	.9862		
26	$\eta$ Libræ	6	+75	+16	21 9.0	+ 7 54 43	+0.9128	.5809	-1.532	8.94201	.9844		
27	49 Libræ	5½	+74	+10	4 1.0	- 9 28 28	+0.8189	.5812	-1.405	8.94442	.9825		
27	$\phi$ Ophiuchi	5	-11	-88	16 56.8	+ 2 58 46	-0.6691	.5813	-1.178	8.94488	.9821		
27	24 Scorpii	5	+27	-35	21 18.6	+ 7 10 57	+0.0254	.5811	-1.098	8.94778	.9794		
28	B.A.C. 5700	6½	+71	+53	3 47.5	-10 34 28	+1.2552	.5808	-0.973	8.95198	.9748		
28	20 Ophiuchi	6	+48	-13	5 49.7	- 8 36 46	+0.4000	.5807	-0.934	8.95057	.9765		
28	B.A.C. 5771	6½	-48	-90	8 33.1	- 5 59 20	-1.1437	.5804	-0.880	8.94766	.9796		
29	B.A.C. 6060	6½	-51	-90	4 44.9	-10 31 50	-1.1376	.5767	-0.465	8.95076	.9763		
29	B.A.C. 6981	6½	+44	-13	6 27.5	- 8 52 56	+0.4115	.5761	-0.439	8.95408	.9721		
29	B.A.C. 6098	6	+69	+10	7 34.1	- 7 48 40	+0.7905	.5758	-0.417	8.95490	.9709		
29	$\mu^1$ Sagittarii	4	+69	+24	12 20.5	- 3 12 40	+0.9901	.5745	-0.325	8.95561	.9699		
29	15 Sagittarii	5	+60	0	12 58.4	- 2 36 5	+0.6275	.5745	-0.310	8.95496	.9708		
29	16 Sagittarii	6	+33	-22	12 59.2	- 2 35 22	+0.2683	.5742	-0.310	8.95427	.9718		
29	21 Sagittarii	5	+38	-16	17 21.0	+ 1 37 5	+0.3485	.5732	-0.224	8.95465	.9713		
29	B.A.C. 6336	6½	+69	+48	22 46.5	+ 6 50 59	+1.2070	.5714	-0.112	8.95641	.9687		
29	B.A.C. 6347	6½	+69	+13	23 13.1	+ 7 16 34	+0.8370	0.5710	-0.105	8.95574	.9697		

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta'$	Log cos $\delta'$
Apr. 30	29 Sagittarii	6	+19	-31	3 56.0	+11 49 29	+0.0817	0.5690	-.0010	$\pi$ 9.5437	9.9717
30	33 Sagittarii	6	+69	+46	5 48.5	-10 21 59	+1.1954	.5686	+0.0028	$\pi$ 9.5644	.9636
30	$\zeta^1$ Sagittarii	6	+44	-10	7 17.6	- 8 56 4	+0.4662	.5679	+0.0054	$\pi$ 9.5508	.9707
30	$\zeta^2$ Sagittarii	4	+69	+21	7 26.9	- 8 47 3	+0.9482	.5679	+0.0061	$\pi$ 9.5597	.9694
30	B.A.C. 6536	6	-35	-90	12 9.2	- 4 14 43	-0.9043	.5662	+0.0149	$\pi$ 9.5232	.9744
30	B.A.C. 6539	6	+69	+18	12 14.3	- 4 9 46	+0.9103	.5662	+0.0151	$\pi$ 9.5580	.9696
30	$\pi$ Sagittarii	3	+69	+22	12 46.0	- 3 39 10	+0.9596	.5659	+0.0163	$\pi$ 9.5588	.9695
30	$d$ Sagittarii	5	-55	-90	16 18.9	- 0 3 39	-1.1582	.5643	+0.0229	$\pi$ 9.5166	.9752
May 1	$f$ Sagittarii	5	+34	-22	5 13.9	-11 45 18	+0.2477	.5585	+0.0467	$\pi$ 9.5355	.9728
1	57 Sagittarii	5½	0	-60	7 54.1	- 9 10 33	-0.3734	.5572	+0.0516	$\pi$ 9.5208	.9747
1	$\sigma$ Capricor.	5½	+59	- 4	20 27.3	+ 2 57 32	+0.5735	.5509	+0.0732	$\pi$ 9.5240	.9743
2	$\pi$ Capricor.	5	+17	-43	0 11.3	+ 6 34 7	-0.1050	.5493	+0.0790	$\pi$ 9.5046	.9766
2	$\rho$ Capri., mult.	5	- 3	-68	0 55.3	+ 7 16 39	-0.4754	.5489	+0.0803	$\pi$ 9.4956	.9776
2	B.A.C. 7043	6½	-27	-90	0 59.2	+ 7 20 24	-0.8837	.5489	+0.0804	$\pi$ 9.4868	.9785
2	$\sigma$ Capri., mult.	6	+47	-14	1 23.6	+ 7 43 59	+0.3998	.5485	+0.0813	$\pi$ 9.5129	.9756
2	$\nu$ Capricor.	5½	+45	-16	6 12.4	-11 36 35	+0.3555	.5463	+0.0884	$\pi$ 9.5036	.9767
2	B.A.C. 7202	6	+72	+10	10 11.5	- 7 45 12	+0.8110	.5445	+0.0945	$\pi$ 9.5055	.9765
2	B.A.C. 7209	6½	+69	+ 2	10 38.3	- 7 19 17	+0.6762	.5441	+0.0954	$\pi$ 9.5019	.9769
2	19 Capricor.	6	+72	+11	13 16.0	- 4 46 37	+0.8226	.5429	+0.0991	$\pi$ 9.4996	.9772
2	21 Capricor.	6	+72	+ 4	16 11.9	- 1 56 22	+0.7079	.5416	+0.1033	$\pi$ 9.4909	.9781
2	$\theta$ Capricor.	4	+68	0	18 39.6	+ 0 26 39	+0.6516	.5403	+0.1069	$\pi$ 9.4841	.9788
2	29 Capricor.	6	-35	-90	23 28.8	+ 5 6 47	-1.0503	.5379	+0.1136	$\pi$ 9.4327	.9835
3	$\iota$ Capricor.	4½	+73	+37	2 38.6	+ 8 10 38	+1.1553	.5364	+0.1178	$\pi$ 9.4754	.9797
3	42 Capricor.	6	- 9	-90	12 17.0	- 6 28 50	-0.6858	.5324	+0.1296	$\pi$ 9.4024	.9857
3	44 Capricor.	6	+19	-47	13 2.0	- 5 45 13	-0.1829	.5320	+0.1306	$\pi$ 9.4129	.9849
3	45 Capricor.	6	+44	-22	13 30.1	- 5 17 59	+0.2674	.5317	+0.1313	$\pi$ 9.4228	.9842
3	$\mu$ Capricor.	5	+ 7	-63	18 9.8	- 0 46 46	-0.4145	.5300	+0.1365	$\pi$ 9.3887	.9866
4	$\iota$ Aquarii	4	+76	+15	0 50.9	+ 5 42 13	+0.8966	.5275	+0.1439	$\pi$ 9.3987	.9859
4	42 Aquarii	6	+65	- 6	6 0.3	+10 41 59	+0.5480	.5254	+0.1492	$\pi$ 9.3676	.9879
4	45 Aquarii	6	+76	+46	7 18.0	+11 57 42	+1.2434	.5251	+0.1502	$\pi$ 9.3824	.9870
4	$\sigma$ Aquarii	4½	- 8	-90	13 27.6	- 6 10 25	-0.7186	.5229	+0.1560	$\pi$ 9.2939	.9914
4	58 Aquarii	6	+21	-48	13 52.6	- 5 39 21	-0.1983	.5220	+0.1560	$\pi$ 9.3024	.9911
4	64 Aquarii	6½	- 7	-90	17 50.2	- 1 48 43	-0.7155	.5217	+0.1691	$\pi$ 9.2690	.9924
4	70 Aquarii	6	+77	0	22 39.2	+ 2 51 47	+0.6613	.5206	+0.1641	$\pi$ 9.2901	.9916
5	$\lambda$ Aquarii	6	-26	-90	7 26.1	+11 23 26	-1.0219	.5184	+0.1708	$\pi$ 9.1646	.9953
5	$\lambda^a$ Aquarii	7	-20	-90	7 31.3	+11 28 30	-0.9404	.5184	+0.1708	$\pi$ 9.1677	.9952
5	$\lambda^b$ Aquarii	7	- 4	-88	7 49.1	+11 45 45	-0.6871	.5183	+0.1710	$\pi$ 9.1768	.9951
5	$\lambda^c$ Aquarii	7½	-13	-90	8 31.3	-11 33 16	-0.8369	.5182	+0.1715	$\pi$ 9.1645	.9953
5	$\chi$ Aquarii	5½	+40	-31	13 37.9	- 6 35 26	+0.0939	.5173	+0.1749	$\pi$ 9.1666	.9953
6	27 Piscium	5½	+11	-66	11 58.4	- 8 53 13	-0.4638	.5151	+0.1863	$\pi$ 8.8734	.9988
6	29 Piscium	5½	- 4	-90	13 39.4	- 7 15 5	-0.7321	.5150	+0.1870	$\pi$ 8.8164	.9991
7	B.A.C. 81	6½	+83	0	1 48.3	+ 4 33 10	+0.6639	.5153	+0.1905	$\pi$ 8.7107	.9994
7	14 Ceti	6½	+31	-42	7 42.2	+10 17 1	-0.1045	.5159	+0.1916	$\pi$ 8.3308	.9999
7	15 Ceti	6½	+45	-28	9 4.2	+11 36 40	+0.1553	.5161	+0.1919	$\pi$ 8.3300	9.9999
7	26 Ceti, mult.	6½	+90	+ 2	22 45.4	+ 0 54 21	+0.7096	.5182	+0.1927	8.0630	0.0000
8	29 Ceti	6½	+63	-13	0 57.8	+ 3 3 1	+0.4258	.5186	+0.1926	8.3578	9.9999
8	33 Ceti	6	+48	-25	2 19.2	+ 4 22 37	+0.2041	.5189	+0.1925	8.4840	.9998
8	35 Ceti	6½	+59	-16	3 22.4	+ 5 23 27	+0.3710	.5193	+0.1924	8.4916	.9998
8	$f$ Piscium	6	+17	-58	6 8.7	+ 8 4 57	-0.3536	.5198	+0.1920	8.7075	.9994
8	B.A.C. 408	6½	-28	-86	8 43.4	+10 35 11	-1.0965	.5206	+0.1917	8.8491	.9989
8	$\nu$ Piscium	4½	+32	-40	18 30.0	- 3 55 16	-0.0741	.5234	+0.1896	8.9245	.9985
9	64 Ceti	6½	+ 3	-76	9 52.9	+11 0 17	-0.6179	.5288	+0.1835	9.1411	.9958
9	$\zeta^1$ Ceti	4½	- 6	-74	10 42.4	+11 48 19	-0.7660	.5292	+0.1830	9.1558	.9955
12	$\alpha$ Tauri	1	+90	+39	6 58.9	+ 5 53 44	+1.0872	.5631	+0.1118	9.4467	.9823
12	Lal. 8678	8	-24	-72	7 31.6	+ 6 25 14	-1.0090	0.5634	+0.1110	9.4963	9.9775

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.											
Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta$	Log cos $\delta$
May 12	89 Tauri	7	+85	+9	7 59.9	+6 52 35	+0.6424	0.5636	+1.102	9.4601	9.9811
12	Lal. 8714	9	-37	-72	8 5.9	+6 58 25	-1.1511	.5637	+1.101	9.5007	.9770
12	Rumk. 1246	7	+61	-4	9 29.2	+8 18 47	+0.3922	.5644	+1.078	9.4697	.9802
12	Rumk. 1247		+90	+45	9 29.5	+8 19 7	+1.1413	.5644	+1.077	9.4521	.9818
12	Rumk. 1251		-31	-72	9 38.3	+8 27 36	-1.0817	.5645	+1.075	9.5032	.9767
12	Rumk. 1254		+90	+51	9 46.5	+8 35 34	+1.1956	.5646	+1.073	9.4514	.9819
12	Rumk. 1258	6	-19	-72	10 2.1	+8 50 34	-0.9434	.5647	+1.069	9.5008	.9770
12	Lal. 8852	9½	+73	+4	10 7.6	+8 55 52	+0.5611	.5647	+1.067	9.4674	.9804
12	Rumk. 1269	6½	-15	-72	11 28.8	+10 14 17	-0.8816	.5654	+1.045	9.5027	.9768
12	Lal. 8933	9	-49	-71	11 28.9	+10 14 25	-1.2359	.5654	+1.045	9.5102	.9763
12	B.A.C. 1468	6	-10	-72	11 33.8	+10 19 6	-0.8058	.5654	+1.044	9.5013	.9770
12	Rumk. 1276		+8	-56	11 56.8	+10 41 22	-0.5054	.5656	+1.037	9.4957	.9776
12	B.A.C. 1478	7½	-3	-70	12 38.1	+11 21 11	-0.6904	.5660	+1.026	9.5012	.9770
12	i Tauri	5½	-3	-71	13 49.6	-11 29 47	-0.6993	.5666	+1.006	9.5040	.9767
12	Rumk. 1300		+80	+8	14 6.7	-11 13 18	+0.6003	.5667	+1.001	9.4769	.9796
12	Rumk. 1301	6	-1	-69	14 7.7	-11 12 22	-0.6688	.5667	+1.001	9.5040	.9767
12	Rumk. 1302	7	+4	-61	14 8.3	-11 11 48	-0.5745	.5667	+1.001	9.5020	.9769
12	m Tauri	5½	+44	-17	20 53.7	-4 40 34	+0.1260	.5699	+0.885	9.5006	.9770
13	B.A.C. 1651	6½	-1	-66	2 47.4	+1 0 39	-0.6607	.5727	+0.778	9.5272	.9739
13	119 Tauri	5½	+90	+33	7 41.9	+5 44 34	+0.9445	.5746	+0.685	9.5013	.9770
13	120 Tauri	6	+90	+40	8 15.8	+6 17 17	+1.0351	.5747	+0.677	9.5002	.9771
13	B.A.C. 1733	6½	-24	-70	8 16.1	+6 17 33	-0.9954	.5747	+0.677	9.5418	.9720
13	B.A.C. 1835	6½	-31	-69	14 34.7	-11 37 27	-1.0725	.5773	+0.651	9.5507	.9707
13	$\chi^1$ Orionis	4½	+17	-39	17 10.2	-9 7 37	-0.3361	.5780	+0.503	9.5391	.9723
13	$\chi^2$ Orionis	6	+51	-7	17 24.7	-8 53 38	+0.2289	.5784	+0.494	9.5282	.9738
13	$\chi^3$ Orionis	5	+65	+4	21 1.9	-5 24 24	+0.4288	.5793	+0.425	9.5275	.9739
13	$\chi^4$ Orionis	5	+35	-21	21 12.9	-5 13 44	-0.0337	.5793	+0.422	9.5369	.9726
14	68 Orionis	6	+65	+5	0 39.3	-1 54 57	+0.4352	.5805	+0.349	9.5302	.9735
14	71 Orionis	5½	+90	+50	1 52.1	-0 44 47	+1.1231	.5808	+0.325	9.5169	.9751
14	15 <sup>1</sup> Geminor.	8	+10	-46	7 15.5	+4 26 41	-0.4680	.5821	+0.214	9.5515	.9706
14	15 <sup>2</sup> Geminor.	6	+9	-46	7 16.0	+4 27 9	-0.4763	.5821	+0.214	9.5517	.9705
14	16 Geminor.	6	+27	-26	7 20.7	+4 31 39	-0.1660	.5821	+0.213	9.5458	.9714
14	$\nu$ Geminor.	4½	+45	-10	7 46.6	+4 56 38	+0.1342	.5822	+0.201	9.5400	.9722
14	$\zeta$ Gemin., mul.	4	+20	-33	22 26.8	-4 55 54	-0.2852	.5848	-0.113	9.5495	.9709
15	56 Geminor.	5½	+17	-38	5 52.0	+2 12 36	-0.3522	.5855	-0.270	9.5481	.9711
15	$g$ Geminor.	5½	+90	+56	15 56.2	+11 54 11	+1.1893	.5856	-0.485	9.5088	.9761
15	85 Geminor.	6½	+10	-48	19 51.8	-8 19 7	-0.4615	.5855	-0.568	9.5387	.9723
15	B.A.C. 2633	6	+59	-2	23 39.6	-4 39 50	+0.3545	.5852	-0.648	9.5172	.9751
16	$d^1$ Cancri	6	+53	-8	7 24.6	+2 47 44	+0.2633	.5844	-0.808	9.5071	.9763
16	$\theta$ Cancri	6	+48	-13	10 50.7	+6 6 9	+0.1957	.5839	-0.875	9.5022	.9769
16	B.A.C. 2854	6½	-5	-71	10 51.8	+6 7 12	-0.7202	.5839	-0.875	9.5219	.9745
16	$\delta$ Cancri	4	+13	-49	16 18.5	+11 21 44	-0.4124	.5829	-0.977	9.5045	.9766
17	7 Leonis, mul.	6½	+90	+15	13 56.7	+8 12 0	+0.7814	.5782	-1.370	9.4119	.9850
18	$\alpha$ Leonis	1½	+90	+36	3 52.4	-2 22 42	+1.1112	.5747	-1.584	9.3389	.9894
18	34 Leonis	6	+8	-63	5 14.8	-1 3 18	-0.5214	.5745	-1.602	9.3837	.9869
18	Mars		+35	-32	5 17.0	-1 1 6	-0.0282	.5591	-1.543	9.3684	.9878
18	$\iota$ Leonis	5	+8	-65	21 34.6	-9 18 32	-0.5145	.5704	-1.808	9.2897	.9916
19	B.A.C. 3837	6½	+34	-37	8 26.3	+1 10 3	-0.0537	.5685	-1.918	9.1835	.9949
19	$\nu$ Virginis	4½	-51	-83	22 29.4	-9 16 28	-1.2993	.5663	-2.023	9.1017	.9965
19	B.A.C. 3996	6	+23	-50	23 56.2	-7 52 41	-0.2423	.5663	-2.032	9.0135	.9977
20	$\delta$ Virginis	6	+56	-18	4 44.1	-3 14 50	+0.3234	.5657	-2.058	8.8833	.9987
20	B.A.C. 4104	6½	-33	-85	9 56.1	+1 46 21	-1.1540	.5653	-2.080	8.9210	.9985
20	c Virginis	5	-39	-86	13 48.7	+5 30 51	-1.2176	.5652	-2.094	8.8480	.9989
21	65 Virginis	6	+86	+40	17 43.2	+8 27 3	+1.2190	.5664	-2.097	8.8658	.9988
21	80 Virginis	6	+75	-5	23 6.7	-10 20 42	+0.5870	0.5671	-2.079	8.9163	9.9985



## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Washington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$
May	23 $\epsilon^1$ Libræ	6	+65	-9	9 31.2	-1 9 6	+0.5110	0.5737	-.1814	n9.2946	9.9914
	23 $\epsilon^2$ Libræ	6	+24	-46	10 33.4	-0 9 12	-0.1651	.5740	-.1801	n9.2759	.9921
	23 18 Libræ, <i>mul.</i>	6½	0	-78	11 29.2	+0 44 41	-0.5995	.5741	-.1791	n9.2654	.9925
	23 B.A.C. 5070	6	-39	-90	22 12.1	+11 4 23	-1.1497	.5764	-.1658	n9.3143	.9906
	24 $\gamma$ Libræ	4½	+64	-7	3 8.0	-8 10 22	+0.5392	.5773	-.1589	n9.3942	.9862
	24 $\eta$ Libræ	6	+75	+15	6 46.1	-4 40 14	+0.8917	.5782	-.1532	n9.4201	.9844
	24 49 Libræ	5½	+74	+8	13 41.5	+2 0 5	+0.7787	.5794	-.1423	n9.4442	.9825
	25 $\phi$ Ophiuchi	5	-15	-90	2 40.6	-9 29 21	-0.7454	.5813	-.1200	n9.4488	.9821
	25 24 Scorpii	5	+22	-40	7 2.6	-5 16 57	-0.0600	.5816	-.1121	n9.4777	.9795
	25 29 Ophiuchi	6	+41	-20	15 32.9	+2 54 32	+0.2952	.5821	-.0958	n9.5057	.9765
	25 B.A.C. 5771	6½	-61	-90	18 15.7	+5 31 17	-1.2540	.5821	-.0908	n9.4765	.9796
	26 B.A.C. 6081	6½	+34	-22	15 59.9	+2 27 31	+0.2542	.5804	-.0464	n9.5408	.9721
	26 B.A.C. 6098	6	+61	-1	17 5.8	+3 31 2	+0.6299	.5801	-.0442	n9.5490	.9709
	26 $\mu^1$ Sagittarii	4	+69	+11	21 48.7	+8 3 35	+0.8189	.5790	-.0343	n9.5561	.9699
	26 15 Sagittarii	5	+46	-11	22 26.2	+8 39 39	+0.4568	.5789	-.0328	n9.5496	.9708
	26 16 Sagittarii	6	+24	-31	22 26.9	+8 40 31	+0.0990	.5789	-.0327	n9.5427	.9718
	27 21 Sagittarii	5	+27	-27	2 45.3	-11 10 40	+0.1706	.5778	-.0240	n9.5465	.9713
	27 B.A.C. 6336	6½	+69	+26	8 6.2	-6 1 27	+1.0155	.5764	-.0131	n9.5641	.9687
	27 B.A.C. 6347	6½	+60	+1	8 32.3	-5 36 14	+0.6464	.5762	-.0119	n9.5574	.9697
	27 29 Sagittarii	6	+9	-43	13 10.9	-1 7 39	-0.1132	.5748	-.0027	n9.5436	.9717
	27 33 Sagittarii	6	+69	+24	15 1.6	+0 39 4	+0.9933	.5743	+0.0011	n9.5644	.9686
	27 $\epsilon^1$ Sagittarii	6	+31	-22	16 29.3	+2 3 34	+0.2637	.5736	+0.0044	n9.5508	.9707
	27 $\epsilon^2$ Sagittarii	4	+69	+6	16 38.5	+2 12 27	+0.7427	.5735	+0.0046	n9.5597	.9694
	27 B.A.C. 6336	6	-50	-90	21 16.0	+6 40 4	-1.1066	.5719	+0.136	n9.5233	.9744
	27 B.A.C. 6539	6	+66	+4	21 21.1	+6 44 56	+0.6973	.5719	+0.137	n9.5599	.9696
	27 $\pi$ Sagittarii	3	+69	+6	21 52.3	+7 15 1	+0.7456	.5715	+0.150	n9.5588	.9695
	28 $f$ Sagittarii	5	+20	-36	14 2.8	-1 8 33	+0.0143	.5643	+0.0462	n9.5355	.9728
	28 57 Sagittarii	5½	-13	-81	16 40.0	+1 23 16	-0.6363	.5630	+0.0512	n9.5208	.9747
	29 $\phi$ Capricor.	5½	+41	-18	4 59.7	-10 42 19	+0.3200	.5568	+0.0729	n9.5240	.9743
	29 $\pi$ Capricor.	5	+3	-59	8 39.7	-7 9 39	-0.3579	.5548	+0.0792	n9.5046	.9766
	29 $\rho$ Capri., <i>mult.</i>	5	-17	-90	9 22.9	-6 27 55	-0.7266	.5542	+0.0806	n9.4956	.9776
	29 B.A.C. 7043	6½	-46	-90	9 26.6	-6 24 17	-1.1321	.5542	+0.0807	n9.4868	.9785
	29 $\phi$ Capri., <i>mult.</i>	6	+31	-23	9 50.6	-6 1 6	+0.1425	.5542	+0.0810	n9.5129	.9756
	29 $\nu$ Capricor.	5½	+29	-31	14 36.5	-1 24 42	+0.0940	.5516	+0.0889	n9.5036	.9767
	29 B.A.C. 7202	6	+58	-6	18 29.5	+2 20 38	+0.5434	.5495	+0.0950	n9.5054	.9765
	29 B.A.C. 7209	6½	+49	-14	18 55.9	+2 46 9	+0.4090	.5477	+0.0956	n9.5018	.9769
	29 19 Capricor.	6	+69	-5	21 31.0	+5 16 9	+0.5525	.5477	+0.0997	n9.4995	.9772
	30 21 Capricor.	6	+52	-12	0 24.0	+8 3 33	+0.4359	.5460	+0.1040	n9.4909	.9781
	30 $\theta$ Capricor.	4	+48	-15	2 49.4	+10 24 17	+0.3782	.5450	+0.1074	n9.4841	.9788
	30 $\iota$ Capricor.	4½	+73	+14	10 41.2	-5 59 1	+0.8740	.5405	+0.1183	n9.4754	.9797
	30 42 Capricor.	6	-27	-90	20 11.8	+3 13 38	-0.9618	.5358	+0.1303	n9.4023	.9857
	30 44 Capricor.	6	+4	-67	29 56.2	+3 56 42	-0.4627	.5353	+0.1313	n9.4129	.9849
	30 45 Capricor.	6	+28	-38	21 24.0	+4 23 36	-0.0148	.5351	+0.1320	n9.4228	.9842
	31 $\mu$ Capricor.	5	-9	-90	2 0.3	+8 51 27	-0.6944	.5330	+0.1373	n9.3886	.9865
	31 $\iota$ Aquarii	4	+69	-3	8 37.1	-8 43 55	+0.6386	.5297	+0.1446	n9.3987	.9859
	31 42 Aquarii	6	+46	-22	13 53.4	-3 37 12	+0.2621	.5276	+0.1501	n9.3676	.9879
	31 45 Aquarii	6	+76	+19	15 0.5	-2 32 4	+0.9543	.5270	+0.1511	n9.3824	.9870
	31 $\phi$ Aquarii	4½	-26	-90	21 0.2	+3 16 57	-0.9993	.5245	+0.1563	n9.2938	.9914
	31 58 Aquarii	6	-4	-86	21 32.0	+3 47 46	-0.6642	.5243	+0.1574	n9.3023	.9911
June	1 64 Aquarii	6½	-25	-90	1 23.6	+7 36 46	-0.995	.5226	+0.1610	n9.2690	.9924
	1 70 Aquarii	6	+55	-16	6 15.3	-11 44 24	+0.3774	.5213	+0.1647	n9.2900	.9916
	1 $\kappa^2$ Aquarii	7	-21	-90	15 22.9	-2 52 44	-0.964	.5183	+0.1717	n9.1767	.9951
	1 $\kappa^4$ Aquarii	7½	-33	-90	16 5.0	-2 11 55	-1.113	.5181	+0.1720	n9.1644	.9953
	1 $\psi^1$ Aquarii	4½	+80	+42	20 38.1	+2 13 17	+1.2274	.5170	+0.1751	n9.2310	.9936
	1 $\chi$ Aquarii	5½	+24	-47	21 10.5	+2 45 10	-0.1822	.5169	+0.1754	n9.1665	9.9953

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.												
Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.						
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta$	Log cos $\delta$	
June	27 Piscium	5½	- 4	-90	19 31.6	+ 0 27 41	-0.7216	0.5132	+1867	88.8732	9.9968	
	29 Piscium	5½	-21	-90	21 12.9	+ 2 6 3	-0.9881	.5132	+1873	88.8162	.9991	
	B.A.C. 81	6½	+62	-14	9 24.2	-10 3 20	+0.4211	.5131	+1910	88.7104	.9994	
	14 Ceti	6½	+18	-57	15 19.6	- 4 17 57	-0.3386	.5131	+1920	88.3302	.9999	
	15 Ceti	6½	+32	-41	16 41.9	- 2 57 56	-0.0770	.5132	+1923	88.3295	.9999	
	26 Ceti, <i>mul.</i>	6½	+68	-10	6 27.3	+10 23 57	+0.4970	.5153	+1932	8.0638	.0000	
	29 Ceti	6½	+49	-25	8 40.4	-11 26 41	+0.2179	.5159	+1931	8.3582	.9999	
	33 Ceti	6	+37	-37	10 2.8	-10 6 40	-0.0014	.5161	+1930	8.4844	.9998	
	35 Ceti	6½	+46	-27	11 5.8	- 9 5 30	+0.1673	.5164	+1930	8.4920	.9998	
	f Piscium	6	+ 7	-73	13 53.0	- 6 23 6	-0.5525	.5169	+1927	8.7077	.9994	
	v Piscium	4½	+23	-51	2 18.1	+ 5 40 32	-0.2503	.5205	+1903	8.9246	.9985	
	64 Ceti	6½	- 6	-76	17 44.8	- 3 20 1	-0.7621	.5265	+1846	9.1411	.9958	
	1 Ceti	4½	-15	-82	18 34.5	- 2 31 51	-0.9082	.5271	+1842	9.1558	.9955	
	B.A.C. 741	6½	- 8	-81	0 24.1	+ 3 7 14	-0.8065	.5299	+1811	9.2000	.9945	
	1 Ceti	4	+90	+15	2 16.0	+ 4 55 47	+0.8837	.5305	+1801	9.1365	.9950	
	B.A.C. 830	6	+18	-54	9 24.3	+11 51 2	-0.3467	.5344	+1753	9.2473	.9931	
	u Ceti	5	+72	- 5	10 36.9	-10 58 35	+0.5360	.5351	+1745	9.2202	.9939	
	B.A.C. 987	6½	+ 9	-63	23 31.6	+ 1 31 54	-0.4982	.5424	+1637	9.3369	.9895	
	f Tauri	4	+90	+31	8 51.8	+10 34 8	+0.0561	.5478	+1544	9.3348	.9896	
	ζ Gemin., <i>mul.</i>	4	+28	-25	4 57.9	+ 3 22 43	-0.1553	.5920	-0.097	9.5495	.9708	
	56 Geminor.	5½	+25	-29	12 13.7	+10 21 47	-0.2099	.5924	-0.255	9.5481	.9711	
	85 Geminor.	6½	+20	-37	1 56.1	- 0 27 19	-0.2977	.5922	-0.559	9.5387	.9723	
	B.A.C. 2683	6	+72	+ 7	5 39.4	+ 3 7 24	+0.5174	.5918	-0.642	9.5172	.9751	
	d Cancri	6	+65	+ 1	13 15.4	+10 26 1	+0.4373	.5905	-0.900	9.5071	.9763	
	θ Cancri	6	+61	- 3	16 37.8	-10 19 20	+0.3746	.5898	-0.672	9.5022	.9769	
	B.A.C. 2854	6½	+ 6	-56	16 38.9	-10 18 18	-0.5353	.5898	-0.673	9.5219	.9745	
	B.A.C. 2899	7	-29	-71	19 8.3	- 7 54 34	-1.0583	.5894	-0.921	9.5282	.9738	
	δ Cancri	4	+24	-37	21 59.9	- 5 9 28	-0.2229	.5886	-0.979	9.5045	.9766	
	7 Leonis, <i>mul.</i>	6½	+90	+29	19 19.8	- 8 37 30	+0.9867	.5820	-1.367	9.4119	.9850	
	8 Leonis	6½	-38	-73	19 47.3	- 8 11 4	-1.1703	.5817	-1.379	9.4665	.9806	
	34 Leonis	6	+20	-48	10 30.2	+ 5 59 25	-0.3019	.5764	-1.604	9.3837	.9860	
	37 Leonis	6	-25	-76	12 39.8	+ 8 4 20	-1.0363	.5753	-1.635	9.3951	.9862	
	1 Leonis	5	+21	-50	2 47.4	- 2 18 25	-0.2903	.5703	-1.807	9.2897	.9916	
	B.A.C. 3837	6½	+47	-25	13 40.9	+ 8 11 58	+0.1718	.5674	-1.913	9.1834	.9949	
	v Virginis	4½	-27	-83	3 50.5	- 2 7 58	-1.0832	.5631	-2.016	9.1018	.9965	
	B.A.C. 3906	6	+35	-37	5 18.3	- 0 43 16	-0.0215	.5627	-2.023	9.0135	.9977	
	δ Virginis	6	+72	- 6	10 9.6	+ 3 58 4	+0.5450	.5616	-2.047	8.8834	.9987	
	B.A.C. 4104	6½	-17	-85	15 26.0	+ 9 3 33	-0.9447	.5605	-2.070	8.9211	.9985	
	c Virginis	5	-21	-86	19 22.1	-11 8 23	-1.0118	.5600	-2.082	8.8481	.9989	
	80 Virginis	6	+75	+ 6	5 21.7	- 2 18 15	+0.7704	.5594	-2.064	8.9161	.9985	
	1 Libræ	6	+75	- 2	16 40.0	+ 7 47 19	+0.6371	.5655	-1.805	8.9296	.9914	
	1 Libræ	6	+30	-32	17 43.8	+ 8 48 52	-0.0486	.5656	-1.794	8.92759	.9921	
	18 Libræ, <i>mul.</i>	6½	+ 6	-68	18 41.1	+ 9 44 12	-0.4894	.5658	-1.783	8.92654	.9925	
	B.A.C. 5070	6	-31	-90	5 40.4	- 3 39 34	-1.0654	.5685	-1.652	8.93143	.9906	
	γ Libræ	4½	+71	- 2	10 43.7	+ 1 12 58	+0.6320	.5700	-1.585	8.93942	.9862	
	7 Libræ	6	+75	+21	14 26.9	+ 4 48 19	+0.9808	.5709	-1.531	8.94201	.9844	
	49 Libræ	5½	+74	+12	21 31.8	+11 38 9	+0.8523	.5727	-1.426	8.94441	.9825	
	φ Ophiuchi	5	-12	-90	10 46.9	+ 0 24 46	-0.7109	.5752	-1.207	8.94488	.9821	
	24 Scorpii	5	+24	-38	15 13.8	+ 4 41 58	-0.0287	.5761	-1.131	8.94777	.9795	
	B.A.C. 5700	6½	+71	+41	21 48.7	+11 2 37	+1.1828	.5773	-1.009	8.95198	.9748	
	29 Ophiuchi	6	+42	-19	23 52.4	-10 58 9	+0.3125	.5777	-0.971	8.95057	.9765	
	B.A.C. 5771	6½	-61	-90	2 37.7	- 8 18 54	-1.2531	.5780	-0.917	8.94765	.9796	
	B.A.C. 6081	6½	+32	-24	0 36.2	-11 8 22	+0.2242	.5784	-0.479	8.95408	.9721	
	B.A.C. 6098	6	+58	- 2	1 42.6	-10 4 23	+0.5994	.5782	-0.457	8.95490	.9709	
	μ Sagittarii	4½	+69	+ 9	6 27.4	- 5 29 56	+0.7805	0.5780	-0.358	8.95561	9.9699	

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$
June	23 15 Sagittarii	5	+43	-13	7 5.0	- 4 53 37	+0.4157	0.5778	-.0348	n9.5496	0.9708
	23 16 Sagittarii	6	+21	-33	7 5.7	- 4 52 56	+0.0565	.5778	-.0348	n9.5427	.9718
	23 21 Sagittarii	5	+24	-30	11 25.4	- 0 42 41	+0.1208	.5772	-.0255	n9.5465	.9713
	23 B.A.C. 6336	6½	+69	+22	16 47.4	+ 4 27 38	+0.9587	.5764	-.0146	n9.5461	.9687
	23 B.A.C. 6347	6½	+55	- 3	17 13.6	+ 4 52 54	+0.5875	.5762	-.0139	n9.5574	.9697
	23 29 Sagittarii	6	+ 5	-48	21 52.7	+ 9 22 0	-.01821	.5752	-.0042	n9.5436	.9717
	23 33 Sagittarii	6	+69	+19	23 43.5	+11 8 49	+0.9220	.5758	-.0003	n9.5643	.9686
	24 $\xi^1$ Sagittarii	6	+26	- 2	1 11.2	-11 26 40	+0.1901	.5744	+0.0024	n9.5508	.9707
	24 $\xi^2$ Sagittarii	4	+62	+ 2	1 20.4	-11 17 46	+0.6697	.5744	+0.0022	n9.5597	.9694
	24 B.A.C. 6536	6	-59	-90	5 57.8	- 6 50 15	-1.1901	.5729	+0.0122	n9.5233	.9744
	24 B.A.C. 6539	6	+57	- 1	6 2.9	- 6 45 24	+0.6162	.5729	+0.0124	n9.5580	.9696
	24 $\pi$ Sagittarii	3	+62	+ 1	6 34.0	- 6 15 20	+0.6639	.5728	+0.0134	n9.5588	.9695
	24 B.A.C. 6671	6	+69	+56	15 48.4	+ 2 39 22	+1.2537	.5696	+0.0318	n9.5656	.9684
	24 $f$ Sagittarii	5	+14	-42	22 41.5	+ 9 18 5	-0.0939	.5668	+0.0456	n9.5355	.9728
	25 57 Sagittarii	5½	-20	-90	1 18.0	+11 49 3	-.07181	.5657	+0.0497	n9.5207	.9747
	25 $\sigma$ Capricor.	5½	+33	-26	13 32.8	- 0 21 19	+0.1901	.5599	+0.0723	n9.5240	.9743
	25 $\pi$ Capricor.	5	- 4	-70	17 11.1	+ 3 9 34	-.04921	.5583	+0.0783	n9.5045	.9766
	25 $\rho$ Capri., mult.	5	-26	-90	17 53.9	+ 3 50 58	-.08614	.5578	+0.0796	n9.4956	.9776
	25 $\sigma$ Capri., mult.	6	-23	-36	18 21.5	+ 4 17 38	+0.0062	.5578	+0.0832	n9.5129	.9772
	25 $\nu$ Capricor.	5½	+21	-40	23 3.0	+ 8 49 38	-.0486	.5551	+0.0881	n9.5036	.9767
	26 B.A.C. 7202	6	+48	-14	2 55.9	-11 25 8	+0.3950	.5530	+0.0944	n9.5054	.9765
	26 B.A.C. 7209	6½	+39	-22	3 22.1	-10 59 52	+0.2604	.5525	+0.0953	n9.5018	.9769
	26 19 Capricor.	6	+49	-14	5 55.7	- 8 31 16	+0.4003	.5514	+0.0991	n9.4995	.9772
	26 21 Capricor.	6	+41	-21	8 47.1	- 5 45 29	+0.2906	.5497	+0.1035	n9.4908	.9781
	26 $\theta$ Capricor.	4	+38	-24	11 11.1	- 3 26 12	+0.2203	.5487	+0.1069	n9.4840	.9788
	26 31 Capricor.	6½	+72	+37	17 3.0	+ 2 14 16	+1.1545	.5455	+0.1154	n9.4901	.9782
	26 $\iota$ Capricor.	4½	+73	+ 3	18 58.4	+ 4 5 59	+0.7065	.5444	+0.1181	n9.4754	.9797
	27 42 Capricor.	4	-41	-90	4 23.4	-10 46 54	-1.1353	.5393	+0.1307	n9.4023	.9857
	27 44 Capricor.	6	- 6	-84	5 7.5	-10 4 13	-.06377	.5390	+0.1314	n9.4128	.9849
	27 45 Capricor.	6	+18	-48	5 39.0	- 9 33 36	-.01913	.5388	+0.1320	n9.4227	.9842
July	27 $\mu$ Capricor.	5	-20	-90	10 8.7	- 5 12 24	-.08732	.5363	+0.1374	n9.3886	.9866
	27 $\iota$ Aquarii	4	+55	-13	16 41.9	+ 1 8 40	+0.4213	.5330	+0.1449	n9.3986	.9859
	27 42 Aquarii	6	+35	-33	21 55.5	+ 6 12 42	+0.0714	.5305	+0.1503	n9.3676	.9879
	27 45 Aquarii	6	+76	+ 6	23 2.1	+ 7 17 16	+0.7616	.5300	+0.1514	n9.3824	.9870
	28 B.A.C. 7835	6½	+77	+42	4 37.8	-11 17 8	+1.2142	.5273	+0.1569	n9.3707	.9877
	28 $\sigma$ Aquarii	4½	-43	-90	4 59.0	-10 56 34	-1.1929	.5273	+0.1571	n9.2938	.9914
	28 58 Aquarii	6	-16	-90	5 30.6	-10 25 58	-.08592	.5270	+0.1578	n9.3023	.9911
	28 64 Aquarii	6½	-42	-90	9 24.9	- 6 38 38	-1.1921	.5253	+0.1612	n9.2689	.9924
	28 70 Aquarii	6	+43	-27	14 10.3	- 2 1 39	+0.1768	.5232	+0.1650	n9.2900	.9916
	29 $\psi^1$ Aquarii	4½	+80	+23	4 28.9	+11 51 49	+1.0214	.5182	+0.1754	n9.2309	.9936
	29 $\chi$ Aquarii	5½	+13	-61	5 1.6	-11 36 26	-.03877	.5181	+0.1757	n9.1665	.9953
	29 $\psi^2$ Aquarii	4½	+80	+56	5 34.3	-11 4 37	+1.3198	.5179	+0.1761	n9.2351	.9935
	29 B.A.C. 8214	6½	+82	+29	14 56.3	- 1 58 43	+1.1066	.5154	+0.1813	n9.1535	.9956
	29 B.A.C. 8274	6½	+83	+36	21 53.9	+ 4 46 59	+1.1841	.5137	+0.1845	n9.0923	.9967
	30 27 Piscium	5½	-17	-90	3 20.7	+10 4 29	-0.9294	.5130	+0.1866	n8.8731	.9988
	30 29 Piscium	5½	-38	-90	5 2.1	+11 42 58	-1.1965	.5129	+0.1873	n8.8161	.9991
	30 B.A.C. 81	6½	+49	-25	17 15.4	- 0 24 22	+0.2169	.5117	+0.1905	n8.7103	.9994
	30 14 Ceti	6½	+ 7	-72	23 12.4	+ 5 22 37	-.05424	.5115	+0.1918	n8.3297	.9999
	1 15 Ceti	6½	+21	-53	0 35.2	+ 6 43 5	-.02796	.5115	+0.1919	n8.3291	9.9999
	1 26 Ceti, mult.	6½	+55	-20	14 26.1	- 3 49 30	+0.3027	.5126	+0.1927	8.0648	0.0000
	1 29 Ceti	6½	+38	-35	16 40.3	- 1 39 4	+0.0242	.5129	+0.1926	8.3587	9.9999
	1 33 Ceti	6	+26	-48	18 3.4	- 0 18 21	-0.1946	.5130	+0.1925	8.4847	.9999
	1 35 Ceti	6½	+35	-38	19 6.9	+ 0 43 24	-.0248	.5133	+0.1924	8.4923	.9998
	1 $f$ Piscium	6	- 4	-83	21 55.5	+ 3 27 15	-.07445	.5138	+0.1921	8.7079	.9994
	2 $\nu$ Piscium	4½	+13	-63	10 28.0	- 8 21 47	-0.4317	0.5170	+0.1898	8.9248	9.9985

**ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.**

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Washington Mean Time of $\phi$ .	At Washington Mean Time of Conjunction.					
			North-ern.	South-ern.		H	Y	$x'$	$y'$	Log sin $\delta'$	Log cos $\delta'$
<b>1869.</b>											
July	3 64 Ceti	6 $\frac{1}{2}$	-16	-82	2 4.9	+ 6 47 52	-0.9300	0.5226	+1842	9.1412	9.9958
	3 $\epsilon^1$ Ceti	4 $\frac{1}{2}$	-27	-82	2 55.2	+ 7 36 39	-1.0757	.5228	+1838	9.1559	.9955
	3 B.A.C. 741	6 $\frac{1}{2}$	-19	-81	8 48.8	-10 40 13	-0.9670	.5254	+1807	9.2000	.9945
	3 $\epsilon^2$ Ceti	4	+90	+ 6	10 42.0	- 8 50 25	+0.7303	.5264	+1796	9.1365	.9959
	3 $\mu$ Ceti	5	+61	-13	19 8.6	- 0 39 2	+0.3915	.5305	+1742	9.2203	.9939
	4 B.A.C. 987	6 $\frac{1}{2}$	+ 2	-73	8 11.6	+11 59 45	-0.6285	.5380	+1638	9.3370	.9895
	4 $f$ Tauri	4	+90	+23	17 37.1	- 2 52 40	+0.9410	.5440	+1545	9.3348	.9896
	5 Wei. III. 1085	8 $\frac{1}{2}$	+90	+21	9 13.5	-11 46 52	+0.8825	.5544	+1362	9.4034	.9856
	5 Lal. 7671	8	-52	-73	11 12.4	- 9 51 56	-1.2703	.5556	+1337	9.4645	.9807
	5 Lal. 7677	8	-50	-73	11 17.3	- 9 47 11	-1.2581	.5558	+1336	9.4645	.9807
	5 Lal. 7702	9 $\frac{1}{2}$	-30	-73	11 32.6	- 9 32 25	-1.0874	.5563	+1329	9.4613	.9810
	5 Wei. IV. 24	9	+90	+33	12 11.4	- 8 54 56	+1.0373	.5566	+1323	9.4100	.9851
	5 Lal. 7753	7 $\frac{1}{2}$	+55	-12	12 16.7	- 8 49 49	+0.2952	.5567	+1322	9.4297	.9837
	5 B.A.C. 1281	7	+12	-55	12 19.6	- 8 47 0	-0.4418	.5568	+1320	9.4483	.9822
	5 Rumk. 1103	7	+85	+ 7	12 24.0	- 8 42 50	+0.6489	.5568	+1319	9.4209	.9844
	5 Rumk. 1110		-25	-73	12 58.6	- 8 9 22	-1.0285	.5572	+1311	9.4644	.9808
	5 48 Tauri	6	+90	+43	14 29.8	- 6 41 12	+1.1489	.5582	+1289	9.4150	.9848
	5 Rumk. 1136	6	+58	- 9	14 57.6	- 6 14 22	+0.3426	.5585	+1283	9.4373	.9831
	5 Lal. 8031	9	-50	-73	15 45.1	- 5 28 29	-1.2517	.5591	+1272	9.4778	.9795
	5 $\gamma$ Tauri	4	+90	+41	16 19.0	- 4 55 44	+1.1275	.5594	+1264	9.4216	.9843
	5 55 Tauri	7	+48	-17	16 21.1	- 4 53 42	+0.1836	.5595	+1263	9.4457	.9824
	5 Rumk. 1161		-12	-73	17 1.7	- 4 14 29	-0.8498	.5599	+1254	9.4724	.9800
	5 Rumk. 1163	8	+35	-20	17 5.2	- 4 11 7	-0.0281	.5599	+1253	9.4531	.9818
	5 $\delta^1$ Tauri	4 $\frac{1}{2}$	- 5	-73	17 41.6	- 3 35 55	-0.7345	.5603	+1244	9.4717	.9801
	5 63 Tauri	6	+43	-22	17 55.8	- 3 22 14	+0.1009	.5605	+1241	9.4525	.9818
	5 B.A.C. 1351	6 $\frac{1}{2}$	+53	-13	17 57.4	- 3 20 41	+0.2609	.5605	+1241	9.4487	.9821
	5 $\delta^2$ Tauri	6	+ 5	-63	18 13.2	- 3 5 27	-0.5694	.5607	+1237	9.4693	.9833
	5 Lal. 8249	7 $\frac{1}{2}$	+27	-37	18 20.8	- 2 58 3	-0.1697	.5608	+1235	9.4693	.9811
	5 Lal. 8256	8	+39	-25	18 23.6	- 2 55 24	+0.0411	.5608	+1234	9.4554	.9815
	5 $\delta^3$ Tauri	5	-24	-73	18 50.2	- 2 29 38	-1.0090	.5611	+1225	9.4811	.9791
	5 70 Tauri	7	+90	+39	18 56.5	- 2 23 34	+1.1038	.5612	+1226	9.4306	.9836
	5 Rumk. 1189		+47	-17	19 16.3	- 2 4 29	-0.1772	.5615	+1221	9.4547	.9816
	5 Rumk. 1192		+29	-35	19 19.4	- 2 1 37	-0.1343	.5615	+1220	9.4623	.9811
	5 Rumk. 1197		-45	-72	19 33.2	- 1 48 7	-1.2196	.5617	+1217	9.4878	.9785
	5 Rumk. 1203		+90	+21	20 9.6	- 1 13 2	+0.8628	.5621	+1208	9.4405	.9828
	5 75 Tauri	6	+90	+18	20 12.3	- 1 10 23	+0.8074	.5622	+1207	9.4420	.9827
	5 $\theta^1$ Tauri	4 $\frac{1}{2}$	+90	+53	20 16.0	- 1 6 50	+1.2320	.5622	+1206	9.4314	.9836
	5 Rumk. 1210		+90	+35	20 26.8	- 0 56 22	+1.0442	.5623	+1203	9.4368	.9831
	5 Rumk. 1212	6	+14	-51	20 34.5	- 0 49 1	-0.4044	.5624	+1201	9.4722	.9890
	5 Rumk. 1214		- 5	-72	20 38.4	- 0 45 15	-0.7316	.5625	+1200	9.4798	.9793
	5 Rumk. 1215	7	- 5	-72	20 39.0	- 0 44 40	-0.7630	.5625	+1200	9.4805	.9792
	5 B.A.C. 1391	5	+90	+38	21 9.1	- 0 15 35	+1.0872	.5629	+1192	9.4378	.9831
	5 Rumk. 1232		+90	+15	21 57.4	+ 0 31 8	+0.7494	.5635	+1180	9.4486	.9821
	5 Rumk. 1233		-16	-73	22 3.8	+ 0 37 17	-0.9036	.5636	+1178	9.4800	.9792
	5 B.A.C. 1406	7	+90	+40	22 31.8	+ 1 4 17	+1.1031	.5640	+1171	9.4415	.9827
	5 Rumk. 1238	10	+90	+28	22 53.7	+ 1 25 24	+0.9464	.5643	+1166	9.4465	.9823
	5 Lal. 8599	9	+17	-47	22 58.0	+ 1 29 33	+0.3544	.5644	+1165	9.4775	.9795
	5 Lal. 8610	8	+66	- 2	23 6.6	+ 1 37 56	+0.4533	.5645	+1162	9.4590	.9812
	5 Lal. 8613	8	+58	-13	23 8.0	+ 1 39 17	+0.2429	.5645	+1162	9.4641	.9808
	5 $\alpha$ Tauri	1	+90	+32	23 32.4	+ 2 2 49	+1.0111	.5644	+1156	9.4467	.9823
	6 Lal. 8678	8	-29	-72	0 4.8	+ 2 34 3	-1.0681	.5648	+1147	9.4963	.9775
	6 89 Tauri	7	+77	+ 5	0 32.8	+ 3 1 5	+0.5728	.5651	+1140	9.4691	.9871
	6 Rumk. 1241		+90	+49	1 18.5	+ 3 45 11	+1.1923	.5656	+1127	9.4471	.9823
	6 Rumk. 1243	8	+90	+53	1 32.2	+ 3 58 27	+1.2243	.5657	+1122	9.4470	.9823
	6 Rumk. 1246	7	+57	- 8	2 1.2	+ 4 26 23	+0.3302	0.5661	+1116	9.4637	9.9832

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.						Log sin $\delta$	Log cos $\delta$
			North- ern.	South- ern.		H	Y	$x'$	$y'$				
1869.					<sup>h</sup> <sup>m</sup>	<sup>h</sup> <sup>m</sup> <sup>s</sup>							
July	6 Rumk. 1247	6	+90	+38	2 1.5	+ 4 26 43	+1.0732	0.5661	+1116	9.4521	9.9818		
	6 Rumk. 1251	6	-37	-72	2 10.2	+ 4 35 6	-1.1495	.5662	+1113	9.5033	.9767		
	6 Rumk. 1254	6	+90	+43	2 18.3	+ 4 42 57	+1.1282	.5663	+1111	9.4514	.9819		
	6 Rumk. 1258	6	-23	-72	2 33.7	+ 4 57 48	-0.9933	.5664	+1107	9.5008	.9770		
	6 Lal. 8852	9½	+70	+ 1	2 39.2	+ 5 3 4	+0.5002	.5665	+1106	9.4674	.9804		
	6 Rumk. 1269	6½	-18	-72	3 59.5	+ 6 20 34	-0.9264	.5674	+1084	9.5028	.9768		
	6 B.A.C. 1468	6	-13	-72	4 4.4	+ 6 25 19	-0.8509	.5675	+1083	9.5013	.9770		
	6 Rumk. 1276	6	+ 6	-60	4 27.2	+ 6 47 19	-0.5518	.5678	+1077	9.4958	.9776		
	6 B.A.C. 1478	7½	- 5	-72	5 8.0	+ 7 26 38	-0.7303	.5682	+1065	9.5012	.9770		
	6 $\epsilon$ Tauri	5½	- 6	-71	6 18.6	+ 4 34 46	-0.7372	.5690	+1046	9.5040	.9767		
	6 Rumk. 1300	6	+75	+ 5	6 35.5	+ 8 51 4	+0.5527	.5692	+1042	9.4760	.9796		
	6 Rumk. 1301	6	- 3	-71	6 36.4	+ 8 51 59	-0.7055	.5692	+1041	9.5040	.9767		
	6 Rumk. 1302	7	+ 2	-64	6 37.0	+ 8 52 33	-0.6121	.5692	+1041	9.5020	.9769		
	6 B.A.C. 1563	6½	-41	-71	12 27.2	- 9 29 40	-1.1798	.5736	+0.9939	9.5261	.9740		
	6 $\pi$ Tauri	5½	+45	-18	13 20.8	- 8 37 53	+0.1128	.5738	+0.9927	9.5007	.9770		
	6 B.A.C. 1651	6½	0	-65	19 3.9	- 3 7 20	-0.6514	.5774	+0.821	9.5272	.9739		
	6 119 Tauri	5½	+90	+33	23 52.3	+ 1 30 31	+0.9526	.5805	+0.729	9.5013	.9770		
	7 120 Tauri	6	+90	+40	0 25.6	+ 2 2 38	+1.0440	.5810	+0.715	9.5002	.9771		
	7 B.A.C. 1733	6	-21	-70	0 25.7	+ 2 2 45	-0.9640	.5810	+0.715	9.5418	.9719		
	7 B.A.C. 1835	6½	-26	-69	6 35.4	+ 7 58 45	-1.0162	.5844	+0.593	9.5507	.9707		
	7 $\chi^1$ Orionis	4½	+21	-36	9 6.8	+10 24 33	-0.2806	.5856	+0.544	9.5392	.9723		
	7 $\chi^2$ Orionis	6	+54	- 5	9 21.0	+10 38 9	+0.2776	.5857	+0.540	9.5282	.9738		
	7 $\chi^3$ Orionis	5	+70	+ 7	12 52.2	- 9 58 37	+0.4867	.5876	+0.464	9.5275	.9739		
	7 $\chi^4$ Orionis	5	+38	-17	13 2.9	- 9 48 15	+0.0312	.5876	+0.461	9.5369	.9726		
	10 $\delta$ Cancri	4	+28	-33	5 34.3	+ 4 12 34	-0.1527	.5968	-0.0985	9.5045	.9766		
	11 7 Leonis, <i>mul.</i>	6½	+90	+35	2 20.4	+ 0 10 40	+1.0651	.5907	-1380	9.4119	.9850		
	11 8 Leonis	6½	-28	-73	2 47.2	+ 0 36 24	-1.0656	.5903	-1390	9.4666	.9805		
	11 34 Leonis	6	+26	-42	17 6.7	- 9 36 27	-0.1945	.5847	-1618	9.3837	.9869		
	11 37 Leonis	6	-16	-76	19 13.6	- 7 34 55	-0.9191	.5839	-1648	9.3951	.9862		
	12 $\iota$ Leonis	5	+27	-43	8 59.9	+ 5 41 30	-0.1714	.5777	-1824	9.2897	.9916		
	12 B.A.C. 3837	6½	+54	-18	19 38.8	- 8 2 40	+0.2924	.5732	-1931	9.1835	.9949		
	13 $\gamma$ Virginis	4½	-17	-83	9 32.3	+ 5 21 14	-0.9464	.5681	-2032	9.1018	.9965		
	13 B.A.C. 3996	6	+43	-30	10 58.8	+ 6 44 40	+0.1071	.5677	-2039	9.0136	.9977		
	13 $\delta$ Virginis	6	+85	0	15 45.4	+11 21 15	+0.6714	.5661	-2063	8.8834	.9987		
	13 B.A.C. 4104	6½	- 8	-85	20 57.4	- 7 37 41	-0.8076	.5644	-2083	8.9211	.9985		
	14 $\epsilon$ Virginis	5	-12	-86	0 50.6	- 3 52 30	-0.8744	.5634	-2094	8.8481	.9989		
	15 80 Virginis	6	+85	+14	10 39.4	+ 4 46 45	+0.8989	.5585	-2063	8.9161	.9985		
	16 $\xi^1$ Libræ	6	+77	+ 5	22 13.6	- 8 51 44	+0.7479	.5604	-1799	8.92945	.9914		
	16 $\xi^2$ Libræ	6	+36	-33	23 18.2	- 7 49 23	+0.0587	.5610	-1788	8.92759	.9921		
	17 18 Libræ, <i>mul.</i>	6½	+12	-60	0 16.3	- 6 53 18	-0.3850	.5611	-1776	8.92654	.9925		
	17 B.A.C. 5070	6	-24	-90	11 25.0	+ 3 52 26	-0.9729	.5632	-1643	8.93143	.9906		
	17 $\gamma$ Libræ	4½	+76	+ 4	16 33.2	+ 8 49 55	+0.7303	.5643	-1577	8.93942	.9862		
	17 $\eta$ Libræ	6	+75	+29	20 20.2	-11 30 56	+1.0784	.5649	-1528	8.94201	.9844		
	18 48 Libræ	4½	-54	-90	2 36.5	- 5 27 48	-1.2534	.5662	-1433	8.93806	.9871		
	18 49 Libræ	5½	+74	+18	3 32.7	- 4 33 34	+0.9437	.5665	-1419	8.94441	.9825		
	18 $\phi$ Ophiuchi	5	- 8	-85	17 2.8	+ 8 28 3	-0.6434	.5691	-1205	8.94488	.9821		
	18 24 Scorpii	5	+28	-34	21 34.7	-11 9 35	+0.0400	.5698	-1126	8.94777	.9795		
	19 B.A.C. 5700	6½	+71	+52	4 17.2	- 4 41 20	+1.2546	.5709	-1009	8.95561	.9748		
	19 29 Ophiuchi	6	+46	-16	6 23.4	- 2 39 41	+0.3757	.5712	-0967	8.95057	.9765		
	19 B.A.C. 5771	6½	-53	-90	9 11.8	+ 0 2 42	-1.2945	.5716	-0919	8.94765	.9796		
	20 B.A.C. 6081	6½	+35	-22	7 34.2	- 2 22 42	+0.2631	.5729	-0483	8.95408	.9721		
	20 B.A.C. 6098	6	+62	0	8 41.8	- 1 17 36	+0.6400	.5729	-0462	8.95490	.9709		
	20 $\mu^1$ Sagittarii	4	+69	+11	13 31.2	+ 3 21 32	+0.8179	.5729	-0364	8.95561	.9639		
	20 15 Sagittarii	5	+46	-11	14 9.5	+ 3 58 28	+0.4498	.5729	-0355	8.95496	.9708		
	20 16 Sagittarii	6	+23	-32	14 10.2	+ 3 59 16	+0.0881	0.5729	-0355	8.95427	9.9718		

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.						
			North- ern.	South- ern.		H	Y	$\alpha'$	$y'$	Log sin $\delta$	Log cos $\delta$	
1869.			$^{\circ}$	$^{\circ}$	$^{\text{h}}$ $^{\text{m}}$ $^{\text{s}}$	$^{\text{h}}$ $^{\text{m}}$ $^{\text{s}}$						
July 20	21 Sagittarii	5	+26	-28	18 33.9	+ 8 13 28	+0.1487	0.5725	-0.0263	n9.5465	9.9713	
21	B.A.C. 6336	6½	+69	+24	0 0.6	-10 31 27	+0.9872	.5720	-0.0155	n9.5641	.9687	
21	B.A.C. 6347	6½	+57	- 2	0 27.2	-10 5 49	+0.6134	.5720	-0.0143	n9.5574	.9697	
21	29 Sagittarii	6	+ 6	-47	5 10.2	- 5 32 52	-0.1657	.5714	-0.0052	n9.5436	.9717	
21	33 Sagittarii	6	+69	+20	7 2.5	- 3 44 36	+0.9434	.5708	-0.0014	n9.5643	.9686	
21	$\epsilon^1$ Sagittarii	6	+27	-25	8 31.2	- 2 18 57	+0.2058	.5706	+0.0018	n9.5508	.9707	
21	$\epsilon^2$ Sagittarii	4	+64	+ 3	8 40.6	- 2 9 57	+0.6882	.5704	+0.0021	n9.5597	.9694	
21	B.A.C. 6536	6	-59	-90	13 21.4	+ 2 20 56	-1.1869	.5698	+0.0108	n9.5233	.9744	
21	B.A.C. 6539	6	+58	- 1	13 26.4	+ 2 25 50	+0.6238	.5695	+0.0117	n9.5583	.9696	
21	$\pi$ Sagittarii	3	+63	+ 2	13 58.0	+ 2 56 14	+0.6771	.5695	+0.0125	n9.5588	.9695	
21	B.A.C. 6671	6	+69	+59	23 18.1	+11 56 48	+1.2612	.5672	+0.0306	n9.5656	.9634	
22	$f$ Sagittarii	5	+14	-43	6 14.9	- 5 23 53	-0.0987	.5651	+0.0439	n9.5355	.9728	
22	57 Sagittarii	5½	-20	-90	8 52.5	- 2 48 43	-0.7280	.5639	+0.0490	n9.5207	.9747	
22	$\sigma$ Sagittarii	5½	+32	-27	21 11.9	+ 9 5 27	+0.1743	.5592	+0.0715	n9.5240	.9743	
23	$\pi$ Capricor.	5	- 5	-72	0 51.1	-11 22 42	-0.5133	.5576	+0.0776	n9.5045	.9766	
23	$\rho$ Capri., mult.	5	-27	-90	1 34.1	-10 41 7	-0.8843	.5573	+0.0790	n9.4956	.9776	
23	$\sigma$ Capri., mult.	6	+22	-38	2 1.8	-10 14 23	-0.0144	.5572	+0.0795	n9.5128	.9756	
23	$\nu$ Capricor.	5½	+19	-41	6 39.6	- 5 46 2	-0.0794	.5559	+0.0874	n9.5036	.9767	
23	B.A.C. 7232	6	+46	-16	10 37.8	- 1 55 35	+0.3693	.5534	+0.0939	n9.5054	.9765	
23	B.A.C. 7239	6½	+38	-23	11 4.0	- 1 30 16	+0.2340	.5531	+0.0944	n9.5018	.9769	
23	19 Capricor.	6	+47	-16	13 37.9	+ 0 58 39	+0.3725	.5517	+0.0986	n9.4995	.9772	
23	21 Capricor.	6	+40	-23	16 29.6	+ 3 44 41	+0.2504	.5506	+0.1030	n9.4908	.9781	
23	$\theta$ Capricor.	4	+36	-26	18 53.7	+ 6 4 6	+0.1881	.5495	+0.1065	n9.4840	.9788	
24	31 Capricor.	6½	+72	+34	0 45.7	+11 44 40	+1.1200	.5463	+0.1151	n9.4901	.9782	
24	$\iota$ Capricor.	4½	+70	+ 1	2 41.1	-10 23 39	+0.6697	.5454	+0.1179	n9.4754	.9797	
24	42 Capricor.	6	-45	-90	12 5.5	- 1 17 7	-1.1811	.5409	+0.1302	n9.4023	.9857	
24	44 Capricor.	6	- 9	-90	12 49.5	- 0 34 31	-0.6831	.5405	+0.1313	n9.4128	.9849	
24	45 Capricor.	6	+16	-51	13 17.0	- 0 7 55	-0.2363	.5403	+0.1316	n9.4227	.9842	
24	$\mu$ Capricor.	5	-23	-90	17 50.2	+ 4 16 46	-0.9223	.5380	+0.1374	n9.3886	.9866	
25	$\iota$ Aquarii	4	+52	-16	0 22.4	+10 36 51	+0.3708	.5349	+0.1448	n9.3986	.9859	
25	42 Aquarii	6	+32	-36	5 35.1	- 8 19 59	+0.0177	.5325	+0.1505	n9.3675	.9879	
25	45 Aquarii	6	+76	+ 3	6 41.4	- 7 15 42	+0.7093	.5320	+0.1516	n9.3824	.9870	
25	B.A.C. 7835	6½	+77	+35	12 16.2	- 1 51 5	+1.1582	.5294	+0.1569	n9.3707	.9877	
25	$\sigma$ Aquarii	4½	-50	-90	12 37.3	- 1 30 35	-1.2514	.5292	+0.1574	n9.2337	.9914	
25	58 Aquarii	6	-20	-90	13 8.8	- 1 0 5	-0.9172	.7291	+0.1578	n9.3023	.9911	
25	70 Aquarii	6	+39	-30	21 46.9	+ 7 22 34	+0.1154	.5254	+0.1654	n9.2899	.9916	
26	$\psi^1$ Aquarii	4½	+80	+18	12 2.9	- 2 46 27	+0.9554	.5230	+0.1756	n9.2309	.9936	
26	$\chi$ Aquarii	5½	+10	-65	12 35.5	- 2 14 46	-0.4551	.5199	+0.1761	n9.1654	.9953	
26	$\psi^2$ Aquarii	4½	+80	+45	13 8.2	- 1 43 2	+1.2543	.5196	+0.1763	n9.2350	.9935	
26	B.A.C. 8214	6½	+82	+25	22 29.1	+ 9 21 41	+1.0385	.5163	+0.1817	n9.1534	.9956	
27	B.A.C. 8274	6½	+83	+30	5 26.2	- 9 53 7	+1.1148	.5149	+0.1849	n9.0923	.9967	
27	27 Piscium	5½	-22	-90	10 52.8	- 4 35 45	-1.0035	.5137	+0.1869	n8.8733	.9988	
27	29 Piscium	5½	-46	-90	12 34.2	- 2 57 13	-1.2709	.5135	+0.1875	n8.8159	.9991	
28	B.A.C. 81	6½	+45	-29	0 48.4	+ 8 56 22	+0.1436	.5118	+0.1907	n9.7100	.9994	
28	14 Ceti	6½	+ 3	-79	6 46.5	- 9 15 38	-0.6183	.5113	+0.1917	n8.3292	.9999	
28	15 Ceti	6½	+17	-58	8 9.6	- 7 54 51	-0.3547	.5111	+0.1919	n8.3286	.9999	
28	26 Ceti, mult.	6½	+50	-24	22 4.8	+ 5 36 54	+0.2304	.5114	+0.1923	8.0657	0.0000	
29	29 Ceti	6½	+34	-39	0 19.9	+ 7 48 13	-0.0491	.5114	+0.1921	8.3591	.9999	
29	33 Ceti	6	+22	-52	1 43.5	+ 9 9 30	-0.2637	.5115	+0.1923	8.4850	.9998	
29	35 Ceti	6½	+31	-42	2 47.5	+10 11 43	-0.0981	.5116	+0.1919	8.4926	.9998	
29	$f$ Piscium	6	- 9	-87	5 37.5	-11 3 7	-0.8210	.5117	+0.1915	8.7081	.9994	
29	$r$ Piscium	4½	+ 9	-63	18 17.1	+ 1 15 3	-0.5051	.5133	+0.1889	8.9251	.9985	
30	64 Ceti	6½	-21	-82	10 5.7	- 7 23 39	-1.0030	.5184	+0.1833	9.1411	.9958	
30	$\epsilon^1$ Ceti	4½	-33	-82	10 56.6	- 6 34 11	-1.1497	.5188	+0.1826	9.1559	.9955	
30	B.A.C. 741	6½	-24	-81	17 55.4	+ 0 14 10	-1.0337	.5211	+0.1735	9.2001	.9945	

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.						Log sin $\delta'$	Log cos $\delta'$
			North- ern.	South- ern.		H	Y	$x'$	$y'$				
July 30	$\epsilon^2$ Ceti	4	+86	+2	18 50.3	+ 1 5 41	+0.6702	0.5219	+1783			9.1366	9.9959
31	B.A.C. 830	6	+ 6	-70	2 10.5	+ 8 12 48	-0.5611	.5250	+1738			9.2474	.9931
31	$\mu$ Ceti	5	+57	-16	3 25.1	+ 9 25 12	+0.3321	.5258	+1728			9.2203	.9939
31	B.A.C. 987	6½	- 2	-77	16 41.7	- 1 42 18	-0.6905	.5325	+1623			9.3370	.9895
Aug. 1	$f$ Tauri	4	+90	+19	2 17.6	+ 7 35 44	+0.8946	.5380	+1534			9.3349	.9896
1	Wei. III. 1085	8½	+90	+18	18 11.6	- 1 0 50	+0.8418	.5483	+1350			9.4034	.9856
1	Lal. 7702	9½	-35	-73	20 33.3	+ 1 16 12	-1.1410	.5499	+1318			9.4613	.9810
1	Wei. IV. 24	9	+90	+30	21 12.8	+ 1 54 24	+0.9984	.5504	+1309			9.4100	.9851
1	Lal. 7753	7½	+52	-15	21 18.3	+ 1 59 38	+0.2515	.5504	+1308			9.4297	.9837
1	B.A.C. 1281	7	+ 9	-58	21 21.2	+ 2 2 31	-0.4906	.5504	+1308			9.4483	.9822
1	Rumk. 1103	7	+80	+ 5	21 25.6	+ 2 6 46	+0.6080	.5505	+1307			9.4209	.9844
1	Rumk. 1110		-30	-73	22 0.9	+ 2 40 52	-1.0804	.5509	+1300			9.4644	.9808
1	48 Tauri	6	+90	+39	23 33.8	+ 4 10 42	+1.1120	.5513	+1278			9.4150	.9848
2	Rumk. 1136	6	+55	-11	0 2.1	+ 4 38 4	+0.3004	.5522	+1272			9.4373	.9831
2	$\gamma$ Tauri	4	+90	+38	1 25.0	+ 5 58 11	+1.0912	.5532	+1253			9.4217	.9843
2	55 Tauri	7	+45	-20	1 27.2	+ 6 0 17	+0.1412	.5532	+1253			9.4457	.9824
2	Rumk. 1161		-16	-73	2 8.5	+ 6 40 15	-0.8993	.5537	+1244			9.4724	.9800
2	Rumk. 1163	8	+33	-31	2 12.0	+ 6 43 38	-0.0718	.5537	+1243			9.4531	.9817
2	$\delta^1$ Tauri	4	- 8	-73	2 49.1	+ 7 19 31	-0.7829	.5542	+1234			9.4717	.9801
2	63 Tauri	6	+40	-24	3 3.5	+ 7 33 26	+0.0584	.5543	+1231			9.4526	.9818
2	B.A.C. 1351	6½	+50	-15	3 5.2	+ 7 35 2	+0.2195	.5543	+1231			9.4487	.9821
2	$\delta^2$ Tauri	6	+ 2	-67	3 21.3	+ 7 50 35	-0.6162	.5544	+1229			9.4693	.9803
2	Lal. 8249	7½	+25	-39	3 29.0	+ 7 58 6	-0.2138	.5546	+1225			9.4603	.9811
2	Lal. 8256		+37	-27	3 31.9	+ 8 0 49	-0.0015	.5547	+1224			9.4554	.9815
2	$\delta^3$ Tauri	5	-28	-73	3 59.0	+ 8 27 2	-1.0585	.5550	+1218			9.4811	.9791
2	70 Tauri	7	+90	+36	4 5.4	+ 8 33 14	+1.0686	.5550	+1217			9.4306	.9836
2	Rumk. 1189		+45	-20	4 25.5	+ 8 52 41	+0.1357	.5553	+1212			9.4547	.9816
2	Rumk. 1192		+27	-37	4 28.7	+ 8 55 46	-0.1777	.5553	+1211			9.4623	.9809
2	Rumk. 1203		+90	+19	5 19.7	+ 9 45 4	+0.8262	.5559	+1198			9.4405	.9828
2	75 Tauri	6	+90	+16	5 22.5	+ 9 47 46	+0.7705	.5559	+1197			9.4420	.9827
2	$\theta^1$ Tauri	4½	+90	+49	5 26.3	+ 9 51 22	+1.1978	.5569	+1197			9.4315	.9836
2	Rumk. 1210		+90	+32	5 37.4	+10 2 7	+1.0088	.5561	+1194			9.4368	.9831
2	Rumk. 1212	6	+12	-54	5 45.1	+10 9 33	-0.4488	.5562	+1192			9.4722	.9800
2	Rumk. 1214		- 8	-73	5 49.1	+10 13 25	-0.7785	.5563	+1191			9.4798	.9793
2	Rumk. 1215	7	- 9	-73	5 49.7	+10 13 59	-0.8098	.5563	+1191			9.4806	.9792
2	B.A.C. 1391	5	+90	+35	6 20.3	+10 43 37	+1.0522	.5567	+1183			9.4378	.9831
2	B.A.C. 1394	7	+90	+40	6 26.5	+10 49 36	+1.1064	.5568	+1181			9.4368	.9831
2	Rumk. 1232		+90	+13	7 9.5	+11 31 10	+0.7131	.5573	+1171			9.4486	.9821
2	Rumk. 1233		+ 2	-66	7 16.0	+11 37 26	-0.6153	.5574	+1169			9.4800	.9792
2	B.A.C. 1406	7	+90	+37	7 44.5	-11 55 4	+1.0688	.5578	+1162			9.4415	.9827
2	Rumk. 1238	10	+90	+25	8 6.8	-11 33 33	+0.9114	.5580	+1157			9.4465	.9823
2	Lal. 8599	9	+14	-50	8 11.1	-11 29 21	-0.3977	.5580	+1156			9.4775	.9795
2	Lal. 8610	8	+63	- 4	8 20.0	-11 20 47	+0.4153	.5582	+1154			9.4590	.9812
2	Lal. 8613	8	+49	-15	8 21.4	-11 19 25	+0.2033	.5582	+1153			9.4641	.9808
2	$\alpha$ Tauri	1	+90	+30	8 46.2	-10 55 27	+0.9767	.5585	+1147			9.4467	.9823
2	Lal. 8678	8	-33	-72	9 19.1	-10 23 40	-1.1153	.5589	+1138			9.4963	.9775
2	89 Tauri	7	+73	+ 3	9 47.6	- 9 56 7	+0.5362	.5592	+1131			9.4601	.9811
2	Lal. 8714	9	-51	-72	9 53.7	- 9 50 15	-1.2546	.5593	+1130			9.5007	.9770
2	Rumk. 1241		+90	+46	10 34.1	- 9 11 13	+1.1598	.5598	+1119			9.4472	.9823
2	Rumk. 1243	8	+90	+49	10 48.1	- 8 57 43	+1.1921	.5599	+1116			9.4470	.9823
2	Rumk. 1246	7	+55	-10	11 17.5	- 8 29 18	+0.2924	.5603	+1108			9.4697	.9802
2	Rumk. 1247		+90	+35	11 17.8	- 8 28 59	+1.0402	.5603	+1108			9.4521	.9818
2	Rumk. 1251		-42	-72	11 26.7	- 8 20 27	-1.1962	.5603	+1106			9.5033	.9767
2	Rumk. 1254		+90	+40	11 35.0	- 8 12 24	+1.0957	.5604	+1104			9.4515	.9819
2	Rumk. 1258	6	-27	-72	11 50.6	- 7 57 18	-1.0385	.5606	+1100			9.5008	9.9770

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.							
			North- ern.	South- ern.		H	Y	x'	y'	Log sin $\delta$	Log cos $\delta$		
1869.													
Aug.	2 Lal. 8852	9½	+67	- 1	11 56.2	- 7 51 47	+0.4642	0.5606	+1.098	9.4678	9.9804		
	2 Rumk. 1269	6½	-21	-72	13 17.9	- 6 33 5	-0.9712	.5616	+1.076	9.5028	.9768		
	2 B.A.C. 1468	6	-16	-72	13 22.9	- 6 28 15	-0.8950	.5616	+1.075	9.5014	.9770		
	2 Rumk. 1276	6	+ 3	-63	13 46.1	- 6 5 52	-0.5934	.5619	+1.069	9.4958	.9776		
	2 B.A.C. 1478	7½	- 8	-72	14 27.5	- 5 25 52	-0.7729	.5624	+1.057	9.5012	.9770		
	2 i Tauri	5½	- 8	-72	15 39.3	- 4 16 32	-0.7789	.5632	+1.039	9.5040	.9767		
	2 Rumk. 1300	6	+72	+ 3	15 56.5	- 3 59 58	+0.5184	.5634	+1.035	9.4760	.9796		
	2 Rumk. 1301	6	- 6	-72	15 57.4	- 3 59 1	-0.7471	.5634	+1.034	9.5040	.9767		
	2 Rumk. 1302	7	0	-68	15 58.0	- 3 58 27	-0.6531	.5634	+1.034	9.5021	.9769		
	2 B.A.C. 1526	6	+90	+60	18 21.9	- 1 39 34	+1.2563	.5649	+0.997	9.4646	.9807		
	2 B.A.C. 1563	6½	-47	-71	21 53.9	+ 1 45 1	-1.2212	.5675	+0.936	9.5261	.9740		
	2 m Tauri	5½	+41	-20	22 43.9	+ 2 33 14	+0.0722	.5683	+0.920	9.5007	.9770		
	3 B.A.C. 1651	6½	- 3	-68	4 36.5	+ 8 13 16	-0.6866	.5724	+0.816	9.5272	.9739		
	3 119 Tauri	5½	+90	+31	9 28.8	-11 4 55	+0.9266	.5756	+0.724	9.5013	.9770		
	3 120 Tauri	6	+90	+38	10 2.6	-10 32 22	+1.0188	.5760	+0.716	9.5002	.9771		
	3 B.A.C. 1835	6½	-28	-69	16 16.9	- 4 31 44	-1.0469	.5798	+0.596	9.5507	.9707		
	3 $\chi^1$ Orionis	4½	+19	-38	18 50.0	- 2 4 14	-0.3074	.5816	+0.543	9.5392	.9723		
	3 $\chi^2$ Orionis	6	+51	- 7	19 4.3	- 1 50 30	+0.2328	.5816	+0.539	9.5282	.9738		
	3 $\chi^3$ Orionis	5	+68	+ 6	22 37.6	+ 1 34 52	+0.4637	.5838	+0.453	9.5275	.9739		
	3 $\chi^4$ Orionis	5	+37	-19	22 48.5	+ 1 45 21	+0.0070	.5840	+0.461	9.5369	.9726		
	4 68 Orionis	6	+69	+ 7	2 10.6	+ 4 59 53	+0.4829	.5859	+0.392	9.5302	.9735		
	4 71 Orionis	5½	+90	+54	3 21.9	+ 6 8 28	+1.1663	.5867	+0.362	9.5169	.9751		
	4 15 <sup>a</sup> Geminor.	8	+15	-40	8 37.3	+11 12 1	-0.3850	.5892	+0.250	9.5515	.9706		
	4 15 <sup>b</sup> Geminor.	6	+14	-41	8 37.8	+11 12 28	-0.3930	.5893	+0.250	9.5517	.9705		
	4 16 Geminor.	6	+32	-22	8 42.4	+11 16 51	-0.0868	.5894	+0.249	9.5458	.9714		
	4 $\nu$ Geminor.	5½	+50	- 6	9 7.6	+11 41 9	+0.2106	.5895	+0.242	9.5400	.9722		
	4 $\zeta$ Gemin., mul.	4	+28	-24	23 19.9	+ 1 20 37	-0.1519	.5958	-0.076	9.5496	.9708		
	5 56 Geminor.	5½	+26	-28	6 27.7	+ 8 11 43	-0.1932	.5981	-0.245	9.5481	.9711		
	8 l Leonis	5	+28	-42	17 27.9	- 8 2 37	-0.1615	.5867	-1.853	9.2898	.9916		
	9 B.A.C. 3837	6½	+54	-18	3 48.0	+ 1 54 19	+0.2968	.5828	-1.961	9.1835	.9949		
	9 $\nu$ Virginis	4½	-16	-83	17 16.1	- 9 7 16	-0.9239	.5776	-2.065	9.1018	.9965		
	9 B.A.C. 3996	6	+43	-29	18 39.8	- 7 46 39	+0.1149	.5770	-2.074	9.0136	.9977		
	9 b Virginis	6	+85	+ 1	23 17.8	- 3 18 43	+0.6706	.5754	-2.097	8.8834	.9987		
	10 B.A.C. 4104	6½	- 7	-85	4 20.2	+ 1 32 50	-0.7872	.5737	-2.117	8.9211	.9985		
	10 c Virginis	5	-11	-86	8 6.4	+ 5 10 53	-0.8535	.5728	-2.129	8.8481	.9989		
	11 80 Virginis	6	+85	+13	16 59.6	-11 5 32	+0.8941	.5655	-2.091	n9.9161	.9985		
	13 $\xi^1$ Libræ	6	+77	+ 5	3 53.9	- 1 24 2	+0.7445	.5647	-1.810	n9.2945	.9914		
	13 $\xi^2$ Libræ	6	+37	-33	4 57.7	- 0 22 29	+0.0602	.5642	-1.798	n9.2759	.9921		
	13 18 Libræ, mul.	6½	+12	-60	5 55.1	+ 0 32 53	-0.3807	.5642	-1.786	n9.2654	.9925		
	13 B.A.C. 5070	6	-24	-90	16 57.1	+11 11 55	-0.9679	.5649	-1.652	n9.3143	.9906		
	13 $\gamma$ Libræ	4½	+76	+ 4	22 3.1	- 7 52 51	+0.7266	.5653	-1.582	n9.3942	.9862		
	14 $\eta$ Libræ	6	+75	+28	1 48.8	- 4 14 59	+1.0732	.5656	-1.529	n9.4201	.9844		
	14 48 Libræ	4½	-53	-90	8 3.6	+ 1 46 37	-1.2517	.5660	-1.435	n9.3806	.9871		
	14 49 Libræ	5½	+74	+18	8 59.6	+ 2 40 45	+0.9388	.5662	-1.421	n9.4441	.9825		
	14 $\phi$ Ophiuchi	5½	- 9	-85	22 29.4	- 8 17 59	-0.6460	.5675	-1.200	n9.4488	.9821		
	15 24 Scorpii	5	+28	-34	3 1.9	- 3 55 0	+0.0365	.5681	-1.125	n9.4777	.9795		
	15 B.A.C. 5700	6½	+71	+52	9 46.0	+ 2 34 49	+1.2508	.5685	-1.003	n9.5198	.9748		
	15 29 Ophiuchi	6	+46	-16	11 52.8	+ 4 37 6	+0.3718	.5686	-0.966	n9.5057	.9765		
	15 B.A.C. 5771	6½	-54	-90	14 42.1	+ 7 20 27	-1.2095	.5686	-0.913	n9.4765	.9796		
	16 B.A.C. 6081	6½	+35	-22	13 15.2	+ 5 5 42	+0.2596	.5694	-0.483	n9.5408	.9721		
	16 B.A.C. 6098	6	+62	0	14 23.5	+ 6 11 31	+0.6377	.5687	-0.457	n9.5490	.9709		
	16 $\mu^1$ Sagittarii	4	+69	+11	19 16.4	+10 54 9	+0.8160	.5687	-0.367	n9.5561	.9699		
	16 15 Sagittarii	5	+45	-11	19 55.1	+11 31 29	+0.4467	.5685	-0.351	n9.5496	.9708		
	16 16 Sagittarii	6	+23	-32	19 55.9	+11 32 11	+0.0837	.5685	-0.359	n9.5427	.9718		
	17 21 Sagittarii	5	+26	-28	0 22.6	- 8 10 30	+0.1448	0.5681	-0.259	n9.5465	9.9713		



## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	x'	y'	Log sin $\delta$	Log cos $\delta$
Aug. 17	B.A.C. 6336	6 $\frac{1}{2}$	+69	+24	5 53.1	- 2 51 37	+0.9868	0.5675	-.0153	n9.5641	9.9687
17	B.A.C. 6347	6 $\frac{1}{2}$	+57	- 2	6 20.0	- 2 25 37	+0.6113	.5674	-.0146	n9.5574	.9697
17	29 Sagittarii	6	+ 6	-47	11 6.4	+ 2 10 44	-0.1702	.5668	-.0051	n9.5436	.9717
17	33 Sagittarii	6	+69	+20	13 0.0	+ 4 0 22	+0.9437	.5664	-.0013	n9.5643	.9686
17	$\xi^1$ Sagittarii	6	+27	-25	14 29.9	+ 5 27 6	+0.2031	.5660	+0.0019	n9.5508	.9707
17	$\xi^2$ Sagittarii	4	+64	+ 3	14 39.3	+ 5 36 13	+0.6876	.5660	+0.0022	n9.5597	.9694
17	B.A.C. 6536	6	-59	-90	19 23.6	+10 10 35	-1.1951	.5651	+0.0115	n9.5233	.9744
17	B.A.C. 6539	6	+58	- 1	19 28.7	+10 15 33	+0.6296	.5651	+0.0117	n9.5580	.9696
17	$\pi$ Sagittarii	3	+63	+ 2	20 0.6	+10 46 21	+0.6770	.5651	+0.0124	n9.5588	.9695
18	f Sagittarii	5	+14	-43	12 29.5	+ 2 41 12	-0.1001	.5607	+0.0441	n9.5355	.9728
18	57 Sagittarii	5 $\frac{1}{2}$	-21	-90	15 9.0	+ 5 15 13	-0.7318	.5600	+0.0487	n9.5207	.9747
19	$\sigma$ Capricor.	5 $\frac{1}{2}$	+32	-27	3 36.7	- 6 42 15	+0.1768	.5562	+0.0711	n9.5240	.9743
19	$\pi$ Capricor.	5	- 5	-72	7 18.2	- 3 8 6	-0.5128	.5545	+0.0771	n9.5045	.9766
19	$\rho$ Capri., <i>mult.</i>	5	-27	-90	8 1.7	- 2 26 4	-0.8851	.5541	+0.0785	n9.4956	.9776
19	$\sigma$ Capri., <i>mult.</i>	6	+22	-37	8 29.6	- 1 59 6	-0.0114	.5537	+0.0795	n9.5128	.9756
19	$\nu$ Capricor.	5 $\frac{1}{2}$	+20	-31	13 14.8	+ 2 36 42	-0.0688	.5522	+0.0871	n9.5036	.9767
19	B.A.C. 7202	6	+46	-15	17 10.6	+ 6 24 47	+0.3758	.5504	+0.0934	n9.5054	.9765
19	B.A.C. 7209	6 $\frac{1}{2}$	+38	-23	17 37.0	+ 6 50 20	+0.2402	.5503	+0.0943	n9.5018	.9769
19	19 Capricor.	6	+47	-15	20 12.4	+ 9 20 39	+0.3798	.5493	+0.0981	n9.4995	.9772
19	21 Capricor.	6	+40	-22	23 5.6	-11 51 50	+0.2580	.5482	+0.1027	n9.4908	.9781
20	$\theta$ Capricor.	4	+37	-26	1 30.9	- 9 31 11	+0.1962	.5470	+0.1065	n9.4840	.9788
20	31 Capricor.	6 $\frac{1}{2}$	+72	+35	7 25.6	- 3 47 52	+1.1332	.5444	+0.1152	n9.4901	.9782
20	$\iota$ Capricor.	4 $\frac{1}{2}$	+71	+ 2	9 21.8	- 1 55 23	+0.6820	.5438	+0.1176	n9.4754	.9797
20	42 Capricor.	6	-44	-90	18 49.9	+ 7 14 49	-1.1719	.5395	+0.1303	n9.4023	.9857
20	44 Capricor.	6	- 6	-88	19 34.1	+ 7 57 40	-0.6722	.5392	+0.1314	n9.4128	.9849
20	45 Capricor.	6	+16	-50	20 1.7	+ 8 24 22	-0.2239	.5392	+0.1318	n9.4227	.9842
21	$\mu$ Capricor.	5	-22	-90	0 36.4	-11 9 29	-0.9099	.5373	+0.1376	n9.3886	.9866
21	$\iota$ Aquarii	4	+53	-15	7 10.4	- 4 47 35	+0.3891	.5343	+0.1450	n9.3986	.9859
21	42 Aquarii	6	+33	-35	12 24.3	+ 0 16 42	+0.0372	.5320	+0.1509	n9.3675	.9879
21	45 Aquarii	6	+76	+ 4	13 30.9	+ 1 21 18	+0.7302	.5316	+0.1520	n9.3823	.9870
21	B.A.C. 7835	6 $\frac{1}{2}$	+77	+38	19 6.5	+ 6 46 49	+1.1830	.5295	-.1573	n9.3707	.9877
21	$\sigma$ Aquarii	4 $\frac{1}{2}$	-47	-90	19 27.7	+ 7 7 23	-1.2320	.5292	+0.1579	n9.2937	.9914
21	58 Aquarii	6	-19	-90	19 59.2	+ 7 37 58	-0.8970	.5291	+0.1582	n9.3022	.9911
21	64 Aquarii	6 $\frac{1}{2}$	-46	-90	23 53.3	+11 25 4	-1.2308	.5276	+0.1618	n9.2688	.9924
22	70 Aquarii	6	+41	-29	4 38.4	- 7 58 22	+0.1420	.5255	+0.1660	n9.2899	.9916
22	$\psi^1$ Aquarii	4 $\frac{1}{2}$	+80	+20	18 55.3	+ 5 53 30	+0.9906	.5208	+0.1764	n9.2308	.9936
22	$\chi$ Aquarii	5 $\frac{1}{2}$	+12	-63	19 27.9	+ 6 25 11	-0.4226	.5206	+0.1768	n9.1664	.9953
22	$\psi^2$ Aquarii	4 $\frac{1}{2}$	+80	+50	20 0.6	+ 6 56 57	+1.2900	.5204	+0.1770	n9.2350	.9935
23	B.A.C. 8214	6 $\frac{1}{2}$	+82	+19	5 21.4	- 7 58 23	+1.0777	.5179	+0.1823	n9.1534	.9956
23	B.A.C. 8274	6 $\frac{1}{2}$	+83	+34	12 18.5	- 1 13 11	+1.1580	.5162	+0.1856	n9.0922	.9967
23	27 Piscium	5 $\frac{1}{2}$	-19	-90	17 45.1	+ 4 4 10	-0.9616	.5148	+0.1877	n8.8729	.9988
23	29 Piscium	5 $\frac{1}{2}$	-41	-90	19 26.5	+ 5 42 40	-1.2291	.5145	+0.1884	n8.8158	.9991
24	B.A.C. 81	6 $\frac{1}{2}$	+48	-26	7 40.9	- 6 23 39	+0.1944	.5127	+0.1916	n8.7099	.9994
24	14 Ceti	6 $\frac{1}{2}$	+ 6	-74	13 39.2	- 0 35 20	-0.5662	.5120	+0.1925	n8.3290	.9999
24	15 Ceti	6 $\frac{1}{2}$	+20	-55	17 2.4	+ 2 45 29	-0.3015	.5120	+0.1927	n8.3283	9.9999
25	26 Ceti, <i>mult.</i>	6 $\frac{1}{2}$	+54	-21	4 58.9	- 9 41 21	+0.2915	.5115	+0.1929	8.0664	0.0000
25	29 Ceti	6 $\frac{1}{2}$	+37	-36	7 14.5	- 7 29 36	+0.0123	.5117	+0.1928	8.3594	9.9999
25	33 Ceti	6	+25	-49	8 38.4	- 6 8 3	-0.2075	.5117	+0.1926	8.4853	.9998
25	35 Ceti	6 $\frac{1}{2}$	+35	-39	9 42.6	- 5 5 40	-0.0358	.5119	+0.1924	8.4929	.9998
25	f Piscium	6	- 5	-79	12 33.1	- 2 19 53	-0.7601	.5121	+0.1920	8.7082	.9994
26	$\nu$ Piscium	4 $\frac{1}{2}$	+13	-63	1 16.3	+10 1 50	-0.4383	.5134	+0.1891	8.9250	.9985
26	64 Ceti	6 $\frac{1}{2}$	-16	-82	17 12.0	+ 1 30 16	-0.9344	.5166	+0.1823	9.1413	.9958
26	$\xi^1$ Ceti	4 $\frac{1}{2}$	-27	-82	18 3.4	+ 2 20 13	-1.0814	.5170	+0.1823	9.1560	.9955
27	B.A.C. 741	6 $\frac{1}{2}$	-19	-81	0 5.8	+ 8 12 10	-0.9687	.5189	+0.1791	9.2003	.9945
27	$\xi^2$ Ceti	4 $\frac{1}{2}$	+90	+ 7	2 1.9	+10 4 55	+0.7523	0.5194	+0.1778	9.1367	9.9959

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.							
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$		
1869.													
Aug. 27	B.A.C. 830	6	+10	-64	9 27.3	- 6 42 42	-0.4860	0.5223	+1730	9.2475	9.9931		
27	$\mu$ Ceti	5	+63	-11	10 43.0	- 5 29 18	+0.4143	.5226	+1722	9.2204	.9939		
28	B.A.C. 987	6½	+ 3	-72	0 11.3	+ 7 34 59	-0.6144	.5282	+1613	9.3371	.9895		
28	$\beta$ Tauri	4	+90	+26	9 57.3	- 6 56 56	+0.9863	.5331	+1520	9.3349	.9896		
29	Wei. III. 1085	8½	+90	+24	2 10.5	+ 8 45 46	+0.9345	.5419	+1336	9.4035	.9856		
29	Lal. 7702	9½	-28	-73	4 35.3	+11 5 58	-1.0688	.5435	+1303	9.4614	.9810		
29	Wei. IV. 24	9	+90	+37	5 15.7	+11 45 0	+1.0929	.5437	+1297	9.4100	.9851		
29	Lal. 7753	7½	+58	-10	5 21.2	+11 50 22	+0.3383	.5439	+1294	9.4297	.9837		
29	B.A.C. 1281	7	+14	-53	5 24.3	+11 53 18	-0.4117	.5439	+1293	9.4483	.9822		
29	Rumk. 1103	7	+90	+10	5 28.8	+11 57 41	+0.6984	.5440	+1292	9.4210	.9844		
29	Rumk. 1110		-24	-73	6 4.8	-11 27 27	-1.0081	.5444	+1284	9.4644	.9808		
29	48 Tauri	6	+90	+49	7 39.8	- 9 55 30	+1.2078	.5453	+1261	9.4150	.9848		
29	Rumk. 1136	6	+61	- 7	8 8.8	- 9 27 30	+0.3876	.5456	+1256	9.4373	.9831		
29	Lal. 8031	9	-47	-73	8 58.3	- 8 39 37	-1.2345	.5462	+1246	9.4779	.9795		
29	$\gamma$ Tauri	4	+90	+47	9 33.6	- 8 5 27	+1.1871	.5465	+1238	9.4217	.9843		
29	55 Tauri	7	+50	-15	9 35.8	- 8 3 19	+0.2268	.5465	+1238	9.4457	.9824		
29	Rumk. 1161		-11	-73	10 18.1	- 7 22 25	-0.8252	.5470	+1228	9.4724	.9800		
29	Rumk. 1163	8	+37	-27	10 21.7	- 7 18 56	+0.0112	.5470	+1227	9.4531	.9817		
29	$\delta$ Tauri	4	- 3	-73	10 59.6	- 6 42 11	-0.7076	.5474	+1219	9.4717	.9831		
29	63 Tauri	6	+45	-20	11 14.4	- 6 27 56	+0.1429	.5475	+1216	9.4526	.9818		
29	B.A.C. 1351	6½	+56	-11	11 16.1	- 6 26 18	+0.3057	.5475	+1216	9.4488	.9821		
29	$\delta$ Tauri	6	+ 7	-61	11 32.5	- 6 10 23	-0.5391	.5477	+1212	9.4693	.9803		
29	Lal. 8249	7½	+29	-34	11 40.5	- 6 2 39	-0.1322	.5478	+1210	9.4693	.9811		
29	Lal. 8256	8	+42	-23	11 43.3	- 5 59 56	+0.0825	.5478	+1209	9.4554	.9815		
29	$\delta$ Tauri	5	-22	-73	12 11.1	- 5 33 3	-0.9868	.5481	+1202	9.4811	.9791		
29	70 Tauri	7	+90	+45	12 17.7	- 5 26 42	+1.1641	.5481	+1201	9.4307	.9836		
29	Rumk. 1189		+50	-15	12 38.3	- 5 6 46	+0.2211	.5483	+1196	9.4547	.9816		
29	Rumk. 1192		+31	-32	12 41.6	- 5 3 35	-0.0958	.5484	+1195	9.4623	.9809		
29	Rumk. 1197		-42	-72	12 55.9	- 4 49 42	-1.2006	.5485	+1192	9.4878	.9784		
29	Rumk. 1203		+90	+25	13 33.8	- 4 13 5	+0.9194	.5489	+1183	9.4405	.9828		
29	75 Tauri	6	+90	+21	13 36.7	- 4 10 17	+0.8630	.5489	+1182	9.4420	.9827		
29	Rumk. 1210		+90	+40	13 51.8	- 3 55 38	+1.1041	.5490	+1179	9.4368	.9831		
29	Rumk. 1212	6	+16	-49	13 59.7	- 3 47 59	-0.3704	.5491	+1177	9.4722	.9800		
29	Rumk. 1214		- 3	-72	14 3.8	- 3 44 4	-0.7036	.5491	+1176	9.4798	.9793		
29	Rumk. 1215	7	- 5	-72	14 4.4	- 3 43 28	-0.7353	.5491	+1176	9.4806	.9792		
29	B.A.C. 1391	5	+90	+44	14 35.8	- 3 13 7	+1.1474	.5494	+1168	9.4379	.9831		
29	B.A.C. 1394	7	+90	+50	14 42.2	- 3 6 58	+1.2925	.5495	+1167	9.4368	.9831		
29	Rumk. 1232		+90	+18	15 26.2	- 2 24 24	+0.8042	.5500	+1156	9.4486	.9821		
29	Rumk. 1233		+ 7	-60	15 32.9	- 2 17 56	-0.5386	.5500	+1154	9.4800	.9792		
29	B.A.C. 1406	7	+90	+46	16 2.0	- 1 49 47	+1.1641	.5503	+1147	9.4416	.9827		
29	Rumk. 1238	10	+90	+32	16 24.8	- 1 27 44	+1.0048	.5506	+1141	9.4465	.9823		
29	Lal. 8599	9	+19	-45	16 29.3	- 1 23 22	-0.3185	.5506	+1140	9.4775	.9795		
29	Lal. 8610	8	+70	+ 1	16 38.3	- 1 14 39	+0.5035	.5507	+1139	9.4591	.9812		
29	Lal. 8613	8	+55	-11	16 39.8	- 1 13 14	+0.2892	.5508	+1139	9.4642	.9808		
29	$\alpha$ Tauri	1	+90	+37	17 5.2	- 0 48 41	+1.0708	.5510	+1133	9.4467	.9823		
29	89 Tauri	7	+83	+ 1	18 8.1	+ 0 12 8	+0.6253	.5517	+1117	9.4601	.9811		
29	Lal. 8714	9	-41	-72	18 14.3	+ 0 18 9	-1.1855	.5518	+1115	9.5008	.9770		
29	Rumk. 1241		+90	+58	18 55.7	+ 0 58 12	+1.2552	.5522	+1104	9.4472	.9823		
29	Rumk. 1243	8	+90	+65	19 10.0	+ 1 12 0	+1.2885	.5524	+1101	9.4470	.9823		
29	Rumk. 1246	7	+61	- 5	19 40.2	+ 1 41 10	+0.3790	.5527	+1093	9.4698	.9802		
29	Rumk. 1247		+90	+43	19 40.5	+ 1 41 31	+1.1353	.5527	+1093	9.4521	.9818		
29	Rumk. 1251		-34	-72	19 49.6	+ 1 50 16	-1.1262	.5528	+1091	9.5033	.9767		
29	Rumk. 1254		+90	+49	19 58.1	+ 1 58 30	+1.1912	.5529	+1089	9.4515	.9819		
29	Rumk. 1258	6	-21	-72	20 14.1	+ 2 13 56	-0.9674	.5531	+1084	9.5008	.9770		
29	Lal. 8852	9½	+75	+ 4	20 19.8	+ 2 19 27	+0.5522	0.5531	+1083	9.4675	9.9804		

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta'$	Log cos $\delta'$
Aug.	29 Rumk. 1269	6½	-16°	-72°	21 43.5	+ 3 40 21	-0.8991	0.5541	+1.062	9.5028	9.9768
	29 Lal. 8933	9	-52°	-71°	21 43.6	+ 3 40 31	-1.2563	.5541	+1.062	9.5103	.9759
	29 B.A.C. 1468	6	-11°	-72°	21 48.6	+ 3 45 20	-0.8224	.5542	+1.061	9.5014	.9770
	29 Rumk. 1276		+ 8°	-57°	22 12.3	+ 4 8 15	-0.5176	.5544	+1.055	9.4958	.9776
	29 B.A.C. 1478	7½	- 3°	-71°	22 54.8	+ 4 49 18	-0.6990	.5549	+1.044	9.5012	.9770
	30 $\epsilon$ Tauri	5½	- 3°	-71°	0 8.4	+ 6 0 25	-0.7057	.5556	+1.025	9.5040	.9767
	30 Rumk. 1300		+81°	+ 8°	0 26.0	+ 6 17 24	+0.6967	.5558	+1.021	9.4769	.9796
	30 Rumk. 1301	6	- 5°	-72°	0 27.0	+ 6 18 22	-0.7268	.5558	+1.020	9.5051	.9765
	30 Rumk. 1302	7	+ 4°	-62°	0 27.6	+ 6 18 57	-0.5782	.5558	+1.020	9.5021	.9769
	30 $\pi$ Tauri	5½	+46°	-15°	7 23.7	-10 59 7	+0.1542	.5604	+0.905	9.5007	.9770
	30 B.A.C. 1651	6½	+ 2°	-63°	13 25.3	- 5 10 0	-0.6148	.5643	+0.801	9.5273	.9739
	30 119 Tauri	5½	+90°	+38°	18 25.3	- 0 20 31	+1.0169	.5674	+0.711	9.5013	.9770
	30 120 Tauri	6	+90°	+45°	18 59.9	+ 0 12 51	+1.1089	.5674	+0.703	9.5002	.9771
	30 B.A.C. 1733	6	-19°	-70°	19 0.0	+ 0 12 58	-0.9309	.5674	+0.703	9.5418	.9719
	31 B.A.C. 1835	6½	-23°	-69°	1 23.9	+ 6 23 13	-0.9826	.5720	+0.580	9.5508	.9707
	31 $\chi^1$ Orionis	4½	+23°	-33°	4 1.0	+ 8 53 38	-0.2355	.5729	+0.533	9.5392	.9723
	31 $\chi^2$ Orionis	6	+58°	- 2°	4 15.6	+ 9 8 45	+0.3309	.5732	+0.529	9.5282	.9738
	31 $\chi^3$ Orionis	5	+75°	+10°	7 54.3	-11 20 26	+0.5421	.5753	+0.455	9.5275	.9739
	31 $\chi^4$ Orionis	5	+42°	-15°	8 5.6	-11 9 37	+0.0809	.5753	+0.452	9.5369	.9726
	31 $\phi^8$ Orionis	6	+77°	+12°	11 32.8	- 7 49 55	+0.5605	.5776	+0.380	9.5302	.9735
	31 71 Orionis	5½	+90°	+65°	12 45.9	- 6 39 32	+1.2511	.5782	+0.356	9.5169	.9751
	31 15 <sup>1</sup> Geminor.	8	+19°	-36°	18 9.2	- 1 28 8	-0.3193	.5808	+0.246	9.5515	.9706
	31 15 <sup>2</sup> Geminor.	6	+18°	-36°	18 9.7	- 1 27 39	-0.3275	.5808	+0.245	9.5517	.9705
	31 16 Geminor.	6	+36°	-18°	18 14.4	- 1 23 10	-0.0181	.5808	+0.244	9.5458	.9714
	31 $\nu$ Geminor.	4½	+54°	- 2°	18 40.2	- 0 58 15	+0.2822	.5812	+0.232	9.5400	.9722
Sept.	1 $\zeta$ Gemin., mul.	4	+31°	-21°	9 12.4	-10 58 49	-0.0910	.5879	-0.079	9.5496	.9708
	1 56 Geminor.	5½	+29°	-25°	16 29.3	- 3 58 39	-0.1372	.5909	-0.247	9.5480	.9711
	1 63 Gemi., mul.	5½	-54°	-69°	18 48.9	- 1 44 25	-1.2445	.5916	-0.299	9.5681	.9680
	2 85 Geminor.	6½	+25°	-32°	6 6.0	+ 9 6 33	-0.2098	.5947	-0.552	9.5387	.9723
	2 B.A.C. 2683	6	+81°	+12°	9 46.0	-11 22 4	+0.6013	.5955	-0.637	9.5172	.9751
	2 $\delta^1$ Cancri	6	+73°	+ 6°	17 13.0	- 4 12 32	+0.5264	.5968	-0.801	9.5071	.9763
	2 $\theta$ Cancri	6	+68°	+ 2°	20 30.4	- 1 2 52	+0.4663	.5972	-0.878	9.5022	.9769
	2 B.A.C. 2854	6½	+12°	-49°	20 31.4	- 1 1 51	-0.4314	.5972	-0.878	9.5219	.9745
	2 35 Cancri	6½	-40°	-70°	21 57.9	+ 0 21 15	-1.1719	.5972	-0.907	9.5347	.9729
	3 $\delta$ Cancri	4	+30°	-31°	1 43.3	+ 3 57 47	-0.1196	.5973	-0.990	9.5045	.9766
	3 80 Cancri	6½	-53°	-72°	12 35.7	- 9 35 17	-1.2621	.5973	-1.217	9.5033	.9767
	3 83 Cancri	6	-60°	-72°	15 24.9	- 6 52 46	-1.2918	.5970	-1.275	9.4969	.9776
	3 7 Leonis, mul.	6½	+90°	+35°	22 12.9	- 0 20 42	+1.0720	.5965	-1.402	9.4119	.9850
	3 8 Leonis	6½	-26°	-73°	22 39.1	+ 0 4 26	-1.0356	.5965	-1.413	9.4665	.9806
	8 80 Virginis	6	+85°	+ 7°	1 38.6	- 0 38 40	+0.7874	.5753	-2.129	n8.9161	.9985
	9 $\xi^1$ Libræ	6	+73°	- 3°	11 24.3	+ 7 54 0	+0.6163	.5736	-1.844	n9.2945	.9914
	9 $\xi^2$ Libræ	6½	+30°	-40°	12 26.0	+ 8 53 32	-0.0584	.5736	-1.832	n9.2759	.9921
	9 18 Libræ, mul.	6½	+ 6°	-63°	13 21.6	+ 9 47 6	-0.4930	.5735	-1.823	n9.2654	.9925
	10 B.A.C. 5070	6	-32°	-90°	0 3.5	- 3 54 4	-1.0775	.5733	-1.681	n9.3143	.9906
	10 $\gamma$ Libræ	4½	+68°	- 4°	5 0.6	+ 0 52 29	+0.5909	.5733	-1.608	n9.3942	.9862
	10 $\eta$ Libræ	6	+75°	+17°	8 40.1	+ 4 23 52	+0.9319	.5733	-1.551	n9.4201	.9844
	10 49 Libræ	5½	+74°	+ 9°	15 39.5	+11 8 7	+0.7984	.5733	-1.440	n9.4441	.9825
	11 $\phi$ Ophiuchi	5	-16°	-90°	4 49.9	- 0 9 56	-0.7702	.5733	-1.215	n9.4488	.9821
	11 24 Scorpii	5	+21°	-42°	9 16.7	+ 4 7 16	-0.0955	.5732	-1.137	n9.4777	.9795
	11 B.A.C. 5700	6½	+71°	+33°	15 53.0	+10 29 15	+1.1066	.5729	-1.012	n9.5198	.9748
	11 29 Ophiuchi	6	+38°	-23°	17 57.5	-11 30 46	+0.2365	.5729	-0.973	n9.5057	.9765
	12 B.A.C. 6081	6½	+27°	-29°	18 59.7	-11 22 24	+0.1297	.5704	-0.480	n9.5408	.9721
	12 B.A.C. 6098	6	+51°	- 8°	20 7.3	-10 17 16	+0.5059	.5704	-0.458	n9.5490	.9709
	13 $\mu^1$ Sagittarii	4	+65°	+ 3°	0 57.4	- 5 37 29	+0.6555	.5696	-0.360	n9.5561	.9699
	13 15 Sagittarii	5	+37°	-19°	1 35.8	- 5 0 28	+0.3185	0.5694	-0.346	n9.5496	9.9708

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of Conj.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta$	Log cos $\delta$
Sept. 13	16 Sagittarii	6	+16	-39	1 36.5	-4 59 45	-0.0426	0.5694	-0.0345	$\alpha$ 9.5427	9.9718
13	21 Sagittarii	5	+19	-36	6 1.4	-0 44 16	+0.0197	.5687	-0.0259	$\alpha$ 9.5465	.9713
13	B.A.C. 6336	6½	+69	+14	11 30.2	+4 32 55	+0.8638	.5674	-0.0146	$\alpha$ 9.5641	.9687
13	B.A.C. 6347	6½	+47	-9	11 57.0	+4 58 45	+0.4872	.5673	-0.0140	$\alpha$ 9.5574	.9657
13	29 Sagittarii	6	0	-55	16 42.3	+9 34 3	-0.2894	.5662	-0.0044	$\alpha$ 9.5437	.9717
13	33 Sagittarii	6	+69	+12	18 35.6	+11 23 24	+0.8220	.5657	-0.0005	$\alpha$ 9.5644	.9680
13	$\epsilon$ Sagittarii	6	+20	-32	20 5.3	-11 10 5	+0.0845	.5655	+0.0022	$\alpha$ 9.5508	.9707
13	$\epsilon'$ Sagittarii	4	+52	-4	20 14.7	-11 0 59	+0.5678	.5655	+0.0024	$\alpha$ 9.5597	.9684
14	B.A.C. 6539	6	+48	-8	1 3.7	-6 22 5	+0.5127	.5639	+0.0120	$\alpha$ 9.5580	.9696
14	$\pi$ Sagittarii	3	+52	-5	1 35.6	-5 51 18	+0.5605	.5638	+0.0133	$\alpha$ 9.5588	.9695
14	B.A.C. 6561	6	+68	+62	2 46.7	-4 42 40	+1.2679	.5636	+0.0155	$\alpha$ 9.5712	.9676
14	B.A.C. 6671	6	+69	+40	11 2.9	+3 16 22	+1.1545	.5611	+0.0312	$\alpha$ 9.5656	.9684
14	$f$ Sagittarii	5	+8	-49	18 5.6	+10 4 39	-0.2045	.5585	+0.0444	$\alpha$ 9.5355	.9728
14	57 Sagittarii	5½	-27	-90	20 45.6	-11 20 47	-0.8341	.5576	+0.0495	$\alpha$ 9.5207	.9747
15	$\sigma$ Capricor.	5½	+27	-32	9 16.4	+0 44 54	+0.0842	.5530	+0.0714	$\alpha$ 9.5240	.9743
15	$\pi$ Capricor.	5	-10	-81	12 59.2	+4 20 15	-0.6026	.5514	+0.0778	$\alpha$ 9.5045	.9766
15	$\rho$ Capri., mult.	5	-33	-90	13 42.9	+5 2 32	-0.9748	.5509	+0.0792	$\alpha$ 9.4956	.9776
15	$\sigma$ Capri., mult.	6	+17	-43	14 11.1	+5 29 45	-0.0999	.5509	+0.0799	$\alpha$ 9.5128	.9757
15	$\nu$ Capricor.	5½	+15	-46	18 53.2	+10 2 39	-0.1599	.5490	+0.0876	$\alpha$ 9.5036	.9776
15	B.A.C. 7202	6	+41	-20	22 55.2	-10 3 15	+0.2960	.5474	+0.0940	$\alpha$ 9.5054	.9765
15	B.A.C. 7209	6½	+34	-27	23 21.8	-9 37 31	+0.1607	.5472	+0.0948	$\alpha$ 9.5018	.9769
16	19 Capricor.	6	+43	-20	1 58.2	-7 6 13	+0.3031	.5461	+0.0987	$\alpha$ 9.4995	.9772
16	21 Capricor.	6	+36	-26	4 52.5	-4 17 32	+0.1841	.5449	+0.1032	$\alpha$ 9.4908	.9781
16	$\theta$ Capricor.	4	+33	-30	7 18.8	-1 55 54	+0.1248	.5439	+0.1068	$\alpha$ 9.4841	.9788
16	31 Capricor.	6½	+72	+29	13 16.0	+3 49 54	+1.0698	.5414	+0.1152	$\alpha$ 9.4900	.9782
16	$\iota$ Capricor.	4½	+67	-2	15 13.0	+5 43 15	+0.6201	.5406	+0.1183	$\alpha$ 9.4753	.9797
17	42 Capricor.	6	-50	-90	0 45.1	-9 2 33	-1.2269	.5367	+0.1308	$\alpha$ 9.4022	.9857
17	44 Capricor.	6	-11	-90	1 29.6	-8 19 24	-0.7249	.5364	+0.1315	$\alpha$ 9.4128	.9850
17	45 Capricor.	6	+14	-53	1 57.4	-7 52 30	-0.2751	.5362	+0.1320	$\alpha$ 9.4227	.9842
17	$\mu$ Capricor.	5	-25	-90	6 34.0	-3 24 25	-0.9568	.5343	+0.1381	$\alpha$ 9.3886	.9866
17	$\iota$ Aquarii	4	+51	-17	13 10.7	+3 0 6	+0.3531	.5318	+0.1455	$\alpha$ 9.3986	.9859
17	42 Aquarii	6	+31	-36	18 26.5	+8 16 25	+0.0073	.5298	+0.1514	$\alpha$ 9.3675	.9879
17	45 Aquarii	6	+76	+2	19 33.6	+9 11 26	+0.7031	.5293	+0.1525	$\alpha$ 9.3823	.9870
18	B.A.C. 7835	6½	+77	+36	1 11.2	-9 21 4	+1.1641	.5276	+0.1571	$\alpha$ 9.3706	.9877
18	$\sigma$ Aquarii	4½	-50	-90	1 32.5	-9 0 21	-1.2546	.5271	+0.1585	$\alpha$ 9.2937	.9914
18	58 Aquarii	6	-20	-90	2 4.2	-8 29 36	-0.9183	.5270	+0.1590	$\alpha$ 9.3023	.9911
18	64 Aquarii	6½	-48	-90	5 59.6	-4 41 11	-1.2474	.5256	+0.1626	$\alpha$ 9.2689	.9924
18	70 Aquarii	6	+41	-29	10 46.1	-0 3 9	+0.1350	.5240	+0.1669	$\alpha$ 9.2899	.9916
19	$\psi$ Aquarii	4½	+80	+22	1 6.6	-10 7 42	+1.0055	.5199	+0.1773	$\alpha$ 9.2308	.9936
19	$\chi$ Aquarii	5½	+12	-62	1 39.4	-9 35 54	-0.4088	.5197	+0.1778	$\alpha$ 9.1664	.9953
19	$\psi^2$ Aquarii	4½	+80	+53	2 12.2	-9 4 1	+1.3074	.5195	+0.1782	$\alpha$ 9.2350	.9935
19	B.A.C. 8214	6½	+82	+29	11 34.8	+0 2 25	+1.1094	.5173	+0.1837	$\alpha$ 9.1534	.9956
19	B.A.C. 8274	6½	+84	+38	18 32.7	+6 48 28	+1.1998	.5159	+0.1872	$\alpha$ 9.0922	.9967
19	27 Piscium	5½	-15	-90	23 59.8	-11 53 43	-0.9139	.5150	+0.1895	$\alpha$ 8.8728	.9988
20	29 Piscium	5½	-36	-90	1 41.3	-10 15 5	-1.1792	.5148	+0.1899	$\alpha$ 8.8158	.9991
20	B.A.C. 81	6½	+51	-23	13 56.1	+1 36 13	+0.2555	.5133	+0.1932	$\alpha$ 8.7099	.9994
20	14 Ceti	6½	+10	-68	19 54.4	+7 27 17	-0.4877	.5129	+0.1942	$\alpha$ 8.3288	.9999
20	15 Ceti	6½	+25	-49	21 17.5	+8 48 6	-0.2201	.5129	+0.1944	$\alpha$ 8.3233	9.9999
21	26 Ceti, mult.	6½	+61	-15	11 13.5	-1 39 18	+0.3939	.5127	+0.1948	8.0666	0.0000
21	20 Ceti	6½	+43	-30	13 28.9	+0 32 19	+0.1174	.5129	+0.1946	8.3597	9.9999
21	33 Ceti	6	+31	-42	14 52.8	+1 53 49	-0.1007	.5129	+0.1944	8.4855	.9998
21	35 Ceti	6½	+41	-33	15 56.9	+2 56 8	+0.0728	.5129	+0.1943	8.4930	.9998
21	$f$ Piscium	6	+2	-82	18 47.3	+5 41 47	-0.6483	.5131	+0.1939	8.7083	.9994
22	$\nu$ Piscium	4½	+20	-54	7 30.0	-5 57 3	-0.3089	.5146	+0.1908	8.9250	.9985
22	64 Ceti	6½	-7	-82	23 25.7	+9 31 26	-0.7891	0.5176	+0.1843	9.1413	9.9958

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Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	x'	y'	Log sin δ'	Log cos δ'
Sept. 23	ε <sup>1</sup> Ceti	4½	-16	-82	0 17.1	+10 21 25	-0.9331	0.5178	+1838	9.1569	9.9955
23	B.A.C. 741	6½	-8	-81	6 20.0	-7 46 13	-0.8130	.5194	+1804	9.2002	.9946
23	ε <sup>2</sup> Ceti	4	+90	+17	8 16.3	-5 53 14	+0.9152	.5199	+1793	9.1367	.9959
23	B.A.C. 830	6	+19	-53	15 42.8	+1 20 14	-0.3197	.5221	+1743	9.2475	.9931
23	μ Ceti	5	+77	-2	16 58.6	+2 33 51	+0.5855	.5225	+1735	9.2204	.9939
24	B.A.C. 987	6½	+13	-58	6 30.6	-8 18 17	-0.4354	.5275	+1622	9.3371	.9895
24	f Tauri	4	+90	+42	16 23.5	+1 13 48	+1.1822	.5317	+1525	9.3349	.9896
25	Wei. III. 1085	8½	+90	+41	8 43.5	-6 53 42	+1.1418	.5392	+1334	9.4035	.9856
25	B.A.C. 1272	6	-36	-73	10 23.8	-5 10 47	-1.1532	.5400	+1313	9.4656	.9826
25	Lal. 7671	8	-28	-73	10 48.8	-4 52 21	-1.0646	.5402	+1308	9.4646	.9807
25	Lal. 7677	8	-27	-73	10 54.1	-4 47 21	-1.0522	.5403	+1307	9.4646	.9807
25	Lal. 7702	9½	-14	-73	11 10.1	-4 31 45	-0.8768	.5404	+1304	9.4613	.9810
25	Lal. 7753	7½	+74	+1	11 56.6	-3 46 43	+0.5421	.5408	+1293	9.4207	.9837
25	B.A.C. 1281	7	+25	-41	11 59.7	-3 43 45	-0.2200	.5408	+1292	9.4483	.9822
25	Rumk. 1103	7	+90	+23	12 4.3	-3 39 20	+0.9049	.5409	+1291	9.4210	.9844
25	Rumk. 1110		-10	-73	12 40.8	-3 3 59	-0.8149	.5412	+1281	9.4644	.9807
25	Rumk. 1136	6	+79	+4	14 46.4	-1 2 21	+0.5934	.5423	+1255	9.4374	.9831
25	Lal. 8031	9	-26	-73	15 36.6	-0 13 48	-1.0418	.5427	+1244	9.4779	.9795
25	55 Tauri	7	+64	-4	16 14.6	+0 23 2	+0.4316	.5429	+1236	9.4457	.9824
25	Rumk. 1161		+2	-67	16 57.5	+1 4 32	-0.6289	.5434	+1226	9.4724	.9800
25	Rumk. 1163	8	+50	-16	17 1.2	+1 8 5	+0.2148	.5434	+1225	9.4532	.9817
25	δ <sup>1</sup> Tauri	4	+8	-58	17 39.7	+1 45 22	-0.5104	.5438	+1216	9.4717	.9801
25	63 Tauri	6	+58	-8	17 54.6	+1 59 51	+0.3478	.5439	+1213	9.4526	.9818
25	B.A.C. 1351	6½	+71	0	17 56.3	+2 1 30	+0.5122	.5439	+1213	9.4488	.9821
25	δ <sup>2</sup> Tauri	6	+18	-47	18 13.1	+2 17 41	-0.3400	.5441	+1208	9.4694	.9803
25	Lal. 8249	7½	+41	-23	18 21.1	+2 25 20	+0.0705	.5441	+1206	9.4603	.9811
25	Lal. 8256	8	+54	-12	18 24.0	+2 28 19	+0.2870	.5442	+1205	9.4554	.9816
25	δ <sup>3</sup> Tauri	5	-9	-73	18 52.2	+2 55 35	-0.7912	.5444	+1200	9.4812	.9791
25	Rumk. 1189		+64	-4	19 19.8	+3 22 17	+0.4273	.5446	+1192	9.4547	.9816
25	Rumk. 1192		+43	-21	19 23.1	+3 25 29	+0.1075	.5447	+1191	9.4623	.9809
25	Rumk. 1197		-24	-72	19 37.7	+3 39 36	-1.0072	.5448	+1188	9.4879	.9784
25	Rumk. 1203		+90	+42	20 16.1	+4 16 53	+1.1321	.5451	+1179	9.4405	.9823
25	75 Tauri		+93	+37	20 19.0	+4 19 36	+1.0752	.5451	+1178	9.4421	.9827
25	Rumk. 1212	6	+27	-36	20 42.4	+4 42 15	-0.1690	.5453	+1172	9.4722	.9800
25	Rumk. 1214		+9	-57	20 46.6	+4 46 15	-0.5053	.5453	+1171	9.4799	.9792
25	Rumk. 1215	7	+7	-60	20 47.2	+4 46 52	-0.5374	.5453	+1171	9.4806	.9792
25	Rumk. 1232		+90	+33	22 10.2	+6 7 13	+1.0170	.5461	+1152	9.4486	.9821
25	Rumk. 1233		+18	-46	22 17.0	+6 13 45	-0.3385	.5462	+1150	9.4801	.9792
25	Rumk. 1238		+90	+52	23 9.8	+7 4 49	+1.2231	.5466	+1137	9.4465	.9823
25	Lal. 8599	9	+30	-33	23 14.3	+7 9 13	-0.1162	.5467	+1136	9.4776	.9795
25	Lal. 8610	8	+90	+13	23 23.5	+7 18 7	+0.7138	.5468	+1134	9.4591	.9812
25	Lal. 8613	8	+73	+1	23 25.0	+7 19 32	+0.4975	.5468	+1134	9.4642	.9808
25	α Tauri	1	+93	+64	23 50.8	+7 44 32	+1.2868	.5470	+1127	9.4467	.9823
26	Lal. 8678	7	-12	-72	0 25.1	+8 17 38	-0.8486	.5473	+1119	9.4963	.9775
26	89 Tauri	7	+93	+21	0 54.7	+8 46 22	+0.8375	.5476	+1110	9.4602	.9811
26	Lal. 8714	9	-8	-72	1 1.1	+8 52 30	-0.9913	.5476	+1108	9.5008	.9770
26	Rumk. 1246	7	+79	+6	2 28.4	+10 16 56	+0.5891	.5484	+1089	9.4698	.9802
26	Rumk. 1251		-18	-72	2 38.0	+10 26 12	-0.9313	.5485	+1087	9.5033	.9768
26	Rumk. 1258	6	-7	-72	3 2.9	+10 50 18	-0.7707	.5487	+1081	9.5008	.9770
26	Lal. 8852	9½	+90	+17	3 8.7	+10 55 54	+0.7645	.5488	+1080	9.4675	.9835
26	Lal. 8927	8½	-34	-71	4 29.1	-11 46 17	-1.1156	.5495	+1059	9.5112	.9758
26	Rumk. 1269	6½	-3	-71	4 33.8	-11 41 46	-0.7015	.5495	+1058	9.5028	.9768
26	Lal. 8933	9	-29	-71	4 34.0	-11 41 35	-1.0624	.5495	+1058	9.5103	.9759
26	B.A.C. 1468	6	+2	-65	4 39.1	-11 36 41	-0.6238	.5495	+1057	9.5014	.9770
26	Rumk. 1276		+19	-44	5 3.2	-11 13 19	-0.3158	0.5497	+1050	9.4958	9.9776

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta$	Log cos $\delta$
Sept. 26	B.A.C. 1478	7½	+ 9	-56	h m	h m s	-0.4991	0.5501	+1039	9.5012	9.9770
26	i Tauri	5½	+ 8	-56	7 1.4	- 9 19 5	-0.5056	.5508	+1020	9.5041	.9767
26	Rumk. 1300		+90	+21	7 19.3	- 9 1 46	+0.8206	.5508	+1016	9.4760	.9796
26	Rumk. 1301	6	+10	-53	7 20.3	- 9 0 48	-0.4731	.5508	+1016	9.5040	.9767
26	Rumk. 1302	7	+16	-47	7 20.9	- 9 0 11	-0.3770	.5508	+1016	9.5017	.9769
26	m Tauri	5½	+60	- 4	14 25.1	- 2 10 10	+0.3642	.5546	+0901	9.5007	.9770
26	B.A.C. 1651	6½	+13	-47	20 34.3	+ 3 46 36	-0.4134	.5578	+0797	9.5273	.9739
27	119 Tauri	5½	+90	+60	1 41.0	+ 8 42 48	+1.2371	.5605	+0709	9.5013	.9770
27	B.A.C. 1733	6½	- 6	-70	2 16.6	+ 9 17 9	-0.7343	.5608	+0697	9.5418	.9719
27	B.A.C. 1835	6½	- 9	-69	8 49.8	- 8 23 15	-0.7877	.5641	+0575	9.5507	.9707
27	$\chi^1$ Orionis	4½	+35	-22	11 30.9	- 5 47 48	-0.0317	.5654	+0523	9.5392	.9723
27	$\chi^2$ Orionis	6	+76	+10	11 45.9	- 5 33 17	+0.5423	.5656	+0518	9.5282	.9736
27	$\chi^3$ Orionis	5	+90	+23	15 30.4	- 1 56 42	+0.7561	.5674	+0448	9.5275	.9738
27	$\chi^4$ Orionis	5	+55	- 4	15 41.9	- 1 45 39	+0.4885	.5675	+0444	9.5369	.9726
27	68 Orionis	6	+98	+25	19 14.7	+ 1 39 43	+0.7734	.5691	+0374	9.5302	.9735
28	15 <sup>i</sup> Geminor.	8	+30	-24	2 2.3	+ 8 12 39	-0.1214	.5720	+0237	9.5512	.9706
28	15 <sup>ii</sup> Geminor.	6	+29	-25	2 2.7	+ 8 13 7	-0.1298	.5720	+0237	9.5517	.9705
28	16 Geminor.	6	+48	- 7	2 7.5	+ 8 17 45	+0.1842	.5720	+0235	9.5457	.9714
28	$\nu$ Geminor.	4½	+70	+ 9	2 34.2	+ 8 43 24	+0.4825	.5722	+0227	9.5401	.9722
28	d Geminor.	6	+36	-17	12 11.6	- 6 0 2	-0.0426	.5760	+0028	9.5719	.9674
28	$\zeta$ Gemin., mul.	4	+43	-10	17 32.5	- 0 50 56	+0.1020	.5781	-0087	9.5495	.9708
29	56 Geminor.	5½	+40	-14	1 3.1	+ 6 22 59	+0.0500	.5805	-0248	9.5481	.9711
29	63 Gemi., mul.	5½	-31	-69	3 27.1	+ 8 41 38	-1.0760	.5813	-0302	9.5630	.9680
29	85 Geminor.	6½	+35	-22	15 5.9	- 4 5 38	-0.0358	.5845	-0554	9.5387	.9724
29	B.A.C. 2683	6	+90	+23	18 53.0	- 0 27 10	+0.7836	.5853	-0636	9.5172	.9751
30	d <sup>i</sup> Cancri	6	+90	+16	2 34.1	+ 6 56 36	+0.6992	.5863	-0803	9.5071	.9763
30	$\theta$ Cancri	6	+85	+11	5 57.7	+10 12 26	+0.6340	.5867	-0874	9.5022	.9769
30	B.A.C. 2854	6½	+21	-39	5 58.8	+10 13 29	-0.2764	.5867	-0874	9.5218	.9745
30	35 Cancri	6½	-26	-70	7 27.9	+11 39 16	-1.0287	.5869	-0906	9.5348	.9729
30	e Cancri	6½	-42	-70	9 34.4	-10 19 6	-1.1901	.5871	-0946	9.5341	.9730
30	B.A.C. 2925	6½	-51	-70	9 46.4	-10 7 28	-1.2459	.5871	-0950	9.5348	.9729
30	$\delta$ Cancri	4	+39	-22	11 20.2	- 8 37 15	+0.0335	.5872	-0986	9.5044	.9766
30	80 Cancri	6½	-35	-72	22 32.0	+ 2 8 56	-1.1387	.5879	-1213	9.5032	.9768
Oct. 1	83 Cancri	6	-39	-72	1 25.8	+ 4 56 14	-1.1722	.5878	-1270	9.4959	.9776
1	7 Leonis, mul.	6½	+90	+49	8 24.7	+11 39 16	+1.2086	.5878	-1402	9.4119	.9850
1	8 Leonis	6½	-17	-73	8 51.6	-11 54 55	-0.9237	.5878	-1411	9.4665	.9805
1	34 Leonis	6	+32	-35	23 8.0	+ 1 49 2	-0.0878	.5868	-1669	9.3837	.9869
2	37 Leonis	6	-11	-76	1 12.7	+ 3 49 4	-0.8123	.5866	-1691	9.3951	.9862
2	l Leonis	5	+31	-39	14 42.8	- 7 11 22	-0.1086	.5853	-1884	9.2896	.9916
3	B.A.C. 3837	6½	+56	-17	1 1.1	+ 2 43 50	+0.3149	.5843	-2000	9.1835	.9949
3	$\nu$ Virginis	4½	-16	-83	14 18.7	- 8 28 18	-0.9399	.5828	-2123	9.1019	.9965
6	$\xi^1$ Libræ	6	+61	-11	21 14.5	- 4 27 45	+0.4533	.5827	-1897	9.2946	.9914
6	$\xi^2$ Libræ	6	+22	-49	22 14.4	- 3 30 4	-0.2139	.5828	-1885	9.2759	.9921
6	18 Libræ, mul.	6½	- 2	-83	23 8.3	- 2 38 10	-0.6443	.5828	-1872	9.2654	.9925
7	B.A.C. 5070	6	-48	-90	9 30.2	+ 7 20 36	-1.2362	.5832	-1729	9.3143	.9906
7	$\gamma$ Libræ	4½	+55	-15	14 17.7	+11 57 21	+0.4004	.5836	-1653	9.3942	.9863
7	$\eta$ Libræ	6	+75	+ 4	17 49.9	- 8 38 20	+0.7311	.5837	-1596	9.4200	.9842
7	$\theta$ Libræ	4½	+74	+41	21 50.8	- 4 46 30	+1.2000	.5838	-1530	9.4492	.9821
8	49 Libræ	5½	+66	- 4	0 35.3	- 2 8 8	+0.5903	.5838	-1480	9.4441	.9826
8	$\chi$ Ophiuchi	6	+72	+32	11 34.2	+ 8 26 9	+1.1097	.5837	-1281	9.4443	.9825
8	$\phi$ Ophiuchi	5	-29	-90	13 19.1	+10 7 7	-0.9687	.5836	-1247	9.4488	.9821
8	24 Scorpii	5	+ 9	-56	17 37.0	- 9 44 38	-0.3086	.5834	-1165	9.4777	.9794
9	B.A.C. 5700	6½	+70	+ 3	0 0.1	- 3 35 51	+0.6995	.5828	-1041	9.5198	.9748
9	29 Ophiuchi	6	+33	-28	2 0.6	- 1 39 54	+0.1475	.5827	-1001	9.5087	.9761
10	B.A.C. 6081	6½	+14	-43	2 16.8	- 2 17 45	-0.1082	0.5783	-0488	9.5498	9.9721

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of Conj.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta'$	Log cos $\delta'$
Oct. 10	B.A.C. 6098	6	+34	-22	3 22.4	-1 14 19	+0.2626	0.5791	-0.0465	n9.5490	9.9709
10	$\mu^1$ Sagittarii	4	+45	-12	8 4.6	+3 17 19	+0.4386	.5769	-0.0368	n9.5551	.9699
10	15 Sagittarii	5	+23	-32	8 42.0	+3 53 19	+0.0761	.5767	-0.0356	n9.5496	.9708
10	16 Sagittarii	6	+3	-54	8 42.7	+3 53 59	-0.2803	.5767	-0.0356	n9.5428	.9718
10	21 Sagittarii	5	+5	-50	13 0.7	+8 2 35	-0.2198	.5753	-0.0264	n9.5466	.9713
10	B.A.C. 6336	6½	+56	-2	18 21.3	-10 48 23	+0.6105	.5737	-0.0149	n9.5641	.9687
10	B.A.C. 6347	6½	+30	-23	18 47.5	-10 23 12	+0.2413	.5735	-0.0141	n9.5574	.9697
10	29 Sagittarii	6	-13	-74	23 26.2	-5 54 32	-0.5265	.5721	-0.0047	n9.5437	.9717
11	31 Sagittarii	6	+68	+41	0 27.7	-4 55 13	+1.1606	.5715	-0.0025	n9.5749	.9670
11	33 Sagittarii	6	+52	-4	1 17.0	-4 7 42	+0.5724	.5711	-0.0013	n9.5644	.9687
11	$\xi^1$ Sagittarii	6	+7	-46	2 44.7	-2 43 8	-0.1570	.5706	+0.0028	n9.5507	.9706
11	$\xi^2$ Sagittarii	4	+34	-19	2 53.9	-2 34 14	+0.3210	.5705	+0.0030	n9.5598	.9694
11	$\sigma$ Sagittarii	4	+68	+27	5 54.0	+0 19 21	+1.0328	.5694	+0.0089	n9.5722	.9674
11	B.A.C. 6539	6	+32	-22	7 37.0	+1 58 42	+0.2671	.5687	+0.0124	n9.5580	.9696
11	$\pi$ Sagittarii	3	+35	-19	8 8.2	+2 28 49	+0.3146	.5685	+0.0134	n9.5587	.9695
11	B.A.C. 6561	6	+68	+26	9 17.9	+3 36 1	+1.0151	.5680	+0.0158	n9.5711	.9676
11	B.A.C. 6671	6	+69	+17	17 25.0	+11 26 1	+0.9049	.5646	+0.0319	n9.5656	.9685
12	$f$ Sagittarii	5	-5	-66	0 21.1	-5 52 23	-0.4395	.5614	+0.0453	n9.5355	.9728
12	57 Sagittarii	5½	-43	-90	2 58.7	-3 20 10	-1.6632	.5601	+0.0505	n9.5207	.9747
12	$\sigma$ Capricor.	5½	+14	-46	15 20.7	+8 36 33	-0.1469	.5541	+0.0725	n9.5239	.9742
12	$\pi$ Capricor.	5	-23	-90	19 1.2	-11 50 16	-0.8262	.5523	+0.0790	n9.5045	.9766
12	$\rho$ Capri., mult.	5	-53	-90	19 44.6	-11 8 22	-1.1956	.5520	+0.0802	n9.4956	.9776
12	$\sigma$ Capri., mult.	5	+5	-57	20 12.4	-10 41 26	-0.3256	.5518	+0.0809	n9.5128	.9757
13	$\nu$ Capricor.	5½	+4	-61	0 57.0	-6 6 16	-0.3753	.5496	+0.0885	n9.5035	.9767
13	B.A.C. 7202	6	+29	-32	4 52.7	-2 18 22	+0.0745	.5476	+0.0952	n9.5054	.9765
13	B.A.C. 7209	6½	+21	-42	5 19.1	-1 52 48	-0.0599	.5473	+0.0960	n9.5018	.9770
13	19 Capricor.	6	+30	-32	7 54.5	+0 37 32	+0.0841	.5462	+0.1000	n9.4996	.9772
13	21 Capricor.	6	+24	-39	10 47.9	+3 25 22	-0.0317	.5448	+0.1045	n9.4908	.9781
13	$\theta$ Capricor.	4	+21	-42	13 13.6	+5 46 22	-0.0885	.5434	+0.1076	n9.4841	.9788
13	31 Capricor.	6½	+72	+13	19 9.5	+11 30 53	-0.8592	.5406	+0.1164	n9.4901	.9782
13	$\iota$ Capricor.	4½	+51	-14	21 6.3	-10 36 4	+0.4131	.5397	+0.1190	n9.4753	.9797
14	44 Capricor.	6	-23	-90	7 22.2	-0 39 27	-0.9156	.5349	+0.1327	n9.4129	.9849
14	45 Capricor.	6	+4	-67	7 49.9	-0 12 36	-0.4665	.5344	+0.1333	n9.4227	.9843
14	$\delta$ Capricor.	3	+73	+45	9 17.3	+1 12 8	+1.2334	.5340	+0.1351	n9.4589	.9813
14	$\mu$ Capricor.	5	-40	-90	12 26.5	+4 15 28	-1.1402	.5326	+0.1391	n9.3886	.9866
14	$\iota$ Aquarii	4	+40	-27	19 3.5	+10 40 23	+0.1751	.5296	+0.1468	n9.3986	.9859
15	42 Aquarii	6	+22	-47	0 20.0	-8 12 44	-0.1622	.5273	+0.1526	n9.3675	.9878
15	45 Aquarii	6	+64	-8	1 27.2	-7 7 32	+0.5342	.5270	+0.1536	n9.3823	.9870
15	50 Aquarii	6	+76	+42	4 13.9	-4 25 46	+1.2241	.5258	+0.1565	n9.3893	.9866
15	B.A.C. 7835	6½	+77	+23	7 5.7	-1 39 10	+1.0042	.5248	+0.1592	n9.3707	.9877
15	58 Aquarii	6	-31	-90	7 58.8	-0 47 36	-1.0745	.5245	+0.1600	n9.3023	.9911
15	70 Aquarii	6	+33	-37	16 42.3	+7 40 31	-0.0080	.5215	+0.1678	n9.2899	.9916
16	$\psi^1$ Aquarii	4½	+80	+13	7 6.0	-2 20 56	+0.8884	.5175	+0.1786	n9.2308	.9936
16	$\psi^2$ Aquarii	4½	+80	+37	8 11.8	-1 17 1	+1.1923	.5174	+0.1793	n9.2350	.9935
16	B.A.C. 8214	6½	+82	+22	17 36.4	+7 51 29	+1.0132	.5155	+0.1851	n9.1534	.9956
17	B.A.C. 8274	6½	+83	+36	0 35.7	-9 21 6	+1.1187	.5143	+0.1887	n9.0923	.9967
17	27 Piscium	5½	-20	-90	6 3.7	-4 2 20	-0.9831	.5135	+0.1909	n8.8729	.9988
17	29 Piscium	5½	-42	-90	7 45.5	-2 23 25	-1.2442	.5132	+0.1915	n8.8158	.9991
18	14 Ceti	6½	+9	-70	2 0.6	-8 39 2	-0.5122	.5112	+0.1962	n8.3238	.9999
18	15 Ceti	6½	+24	-51	3 24.8	-7 17 8	-0.2418	.5112	+0.1965	n8.3282	9.9999
18	26 Ceti, mult.	6½	+62	-15	17 17.9	+6 12 33	+0.4037	.5126	+0.1969	8.0667	0.0000
18	29 Ceti	6½	+45	-30	19 35.2	+8 26 2	+0.1329	.5129	+0.1968	8.3597	9.9999
18	33 Ceti	6	+31	-44	20 59.0	+9 47 27	-0.0817	.5130	+0.1967	8.4855	.9998
18	35 Ceti	6½	+42	-32	22 3.0	+10 49 43	+0.0941	.5132	+0.1966	8.4930	.9993
19	$f$ Piscium	6	+3	-79	0 53.2	-10 24 54	-0.6193	0.5136	+0.1963	8.7082	9.9994

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.											
Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta'$	Log cos $\delta'$
Oct. 19	$\gamma$ Piscium	4 $\frac{1}{2}$	+24	-51	13 34.2	+ 1 54 35	-0.2513	0.5154	+1935	8.9251	9.9985
20	64 Ceti	6 $\frac{1}{2}$	- 1	-82	5 26.4	- 6 40 27	-0.6928	.5191	+1870	9.1414	.9958
20	$\epsilon^1$ Ceti	4 $\frac{1}{2}$	-10	-82	6 17.7	- 5 50 38	-0.8369	.5194	+1866	9.1569	.9955
20	B.A.C. 741	6 $\frac{1}{2}$	- 2	-81	12 18.8	+ 0 0 6	-0.7044	.5212	+1833	9.2003	.9945
20	$\epsilon^2$ Ceti	4	+90	+24	14 14.6	+ 1 52 31	+1.0260	.5220	+1821	9.1367	.9959
20	B.A.C. 830	6	+27	-45	21 38.9	+ 9 3 47	-0.1913	.5243	+1770	9.2475	.9931
20	$\mu$ Ceti	5	+90	+ 5	22 54.4	+10 17 2	+0.7153	.5248	+1769	9.2204	.9939
21	B.A.C. 987	6 $\frac{1}{2}$	+22	-48	12 22.2	- 0 39 19	-0.2780	.5298	+1647	9.3371	.9895
22	B.A.C. 1272	6	-19	-73	16 14.5	+ 2 21 17	-0.9491	.5421	+1332	9.4656	.9806
22	Lal. 7671	8	-12	-73	16 33.5	+ 2 39 40	-0.8604	.5422	+1328	9.4646	.9807
22	Lal. 7677	8	-12	-73	16 38.6	+ 2 44 39	-0.8478	.5422	+1327	9.4646	.9807
22	Lal. 7702	9 $\frac{1}{2}$	- 1	-71	16 54.7	+ 3 0 12	-0.6719	.5423	+1324	9.4614	.9810
22	Lal. 7753	7 $\frac{1}{2}$	+90	+13	17 41.1	+ 3 45 7	+0.7506	.5427	+1313	9.4297	.9837
22	B.A.C. 1281	7	+37	-29	17 44.2	+ 3 48 6	-0.0065	.5427	+1312	9.4482	.9822
22	Rumk. 1103	7	+90	+39	17 48.7	+ 3 52 30	+1.1146	.5427	+1311	9.4210	.9844
22	Rumk. 1110		+ 3	-66	18 25.1	+ 4 27 45	-0.6978	.5430	+1304	9.4644	.9888
22	Rumk. 1136	6	+90	+17	20 30.5	+ 6 29 6	+0.8058	.5438	+1276	9.4373	.9831
22	Lal. 8031	9	-11	-73	21 20.5	+ 7 17 32	-0.8316	.5443	+1265	9.4779	.9794
22	55 Tauri	7	+85	+ 8	21 58.5	+ 7 54 19	+0.6460	.5446	+1256	9.4457	.9824
22	Lal. 8122	9	-39	-72	22 38.6	+ 8 33 10	-1.1730	.5449	+1247	9.4889	.9783
22	Rumk. 1161		+14	-52	22 41.3	+ 8 35 44	-0.4157	.5449	+1246	9.4724	.9800
22	Rumk. 1163	8	+65	- 4	22 45.0	+ 8 39 17	+0.4296	.5449	+1245	9.4531	.9817
22	$\delta^1$ Tauri	4	+21	-44	23 23.4	+ 9 16 31	-0.2961	.5452	+1237	9.4717	.9830
22	63 Tauri	6	+76	+ 3	23 38.4	+ 9 30 57	+0.5641	.5453	+1234	9.4525	.9818
22	B.A.C. 1351	6 $\frac{1}{2}$	+90	+13	23 40.1	+ 9 32 35	+0.7290	.5453	+1234	9.4487	.9821
22	$\delta^2$ Tauri	6	+30	-32	23 56.7	+ 9 48 43	-0.1246	.5454	+1228	9.4673	.9803
23	Lal. 8249	7 $\frac{1}{2}$	+55	-12	0 4.8	+ 9 56 32	+0.2869	.5455	+1226	9.4604	.9811
23	Lal. 8256	8	+71	0	0 7.7	+ 9 59 24	+0.5039	.5455	+1225	9.4554	.9816
23	$\delta^3$ Tauri	5	+ 5	-63	0 35.8	+10 26 35	-0.5739	.5457	+1217	9.4812	.9791
23	Rumk. 1189		+85	+ 8	1 3.4	+10 53 14	+0.6457	.5459	+1210	9.4547	.9816
23	Rumk. 1192		+57	-10	1 6.7	+10 56 26	+0.3254	.5459	+1209	9.4623	.9809
23	Rumk. 1197		- 8	-72	1 21.3	+11 10 32	-0.7911	.5461	+1205	9.4879	.9784
23	Rumk. 1212	6	+40	-24	2 25.9	-11 46 52	+0.0501	.5466	+1190	9.4722	.9800
23	Rumk. 1214		+21	-43	2 30.1	-11 42 53	-0.2870	.5467	+1189	9.4798	.9792
23	Rumk. 1215	7	+19	-45	2 30.2	-11 42 44	-0.3200	.5467	+1189	9.4806	.9791
23	Rumk. 1233		+30	-33	4 0.4	-10 15 27	-0.1175	.5474	+1167	9.4800	.9792
23	Lal. 8599	9	+43	-21	4 57.7	- 9 20 2	+0.1065	.5478	+1154	9.4775	.9795
23	Lal. 8610	8	+90	+27	5 6.9	- 9 11 9	+0.9338	.5479	+1152	9.4590	.9813
23	Lal. 8613	8	+90	+13	5 8.4	- 9 9 44	+0.7219	.5479	+1152	9.4641	.9838
23	Lal. 8678	8	+ 2	-66	6 8.4	- 8 11 38	-0.6263	.5484	+1137	9.4964	.9775
23	89 Tauri	7	+90	+37	6 33.1	- 7 42 56	+1.0651	.5486	+1130	9.4692	.9812
23	Lal. 8714		- 7	-72	6 44.4	- 7 36 48	-0.7686	.5487	+1128	9.5008	.9771
23	Rumk. 1246	7	+90	+23	8 11.7	- 6 12 22	+0.8179	.5493	+1106	9.4698	.9832
23	Rumk. 1251		- 3	-71	8 21.3	- 6 3 6	-0.7065	.5494	+1104	9.5032	.9763
23	Rumk. 1258	6	+ 6	-60	8 46.2	- 5 38 59	-0.5449	.5496	+1097	9.5009	.9771
23	Lal. 8852	9 $\frac{1}{2}$	+90	+32	8 52.0	- 5 33 24	+0.9947	.5496	+1096	9.4674	.9834
23	Lal. 8914	8	-29	-71	10 2.3	- 4 25 23	-1.0710	.5501	+1078	9.5145	.9754
23	Lal. 8927	8 $\frac{1}{2}$	-15	-71	10 12.5	- 4 15 33	-0.8861	.5502	+1076	9.5112	.9759
23	Rumk. 1269	6 $\frac{1}{2}$	+11	-54	10 17.2	- 4 11 1	-0.4737	.5502	+1075	9.5027	.9768
23	Lal. 8933	9	- 9	-71	10 17.4	- 4 10 51	-0.8360	.5502	+1075	9.5102	.9763
23	B.A.C. 1468	6	+15	-49	10 22.4	- 4 05 56	-0.3960	.5503	+1074	9.5014	.9770
23	Rumk. 1276		+32	-30	10 46.6	- 3 42 33	-0.0864	.5505	+1067	9.4958	.9776
23	Rumk. 1478	7 $\frac{1}{2}$	+22	-41	11 29.8	- 3 0 44	-0.2695	.5508	-1056	9.5013	.9770
23	$\epsilon^1$ Tauri	5 $\frac{1}{2}$	+22	-41	12 44.8	- 1 48 12	-0.2745	.5513	+1036	9.5040	.9766
23	Rumk. 1300		+90	+37	13 2.8	- 1 30 54	+1.0563	0.5514	+1030	9.4769	9.9796



## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Washington Mean Time of $\odot$ .	At Washington Mean Time of Conjunction.						
			North-ern.	South-ern.		H	Y	$x'$	$y'$	Log sin $\delta'$	Log cos $\delta'$	
1869.												
Oct. 23	Rumk. 1301	6	+24	-39	13 3.8	- 1 20 55	-0.2413	0.5514	+1030	9.5040	9.9766	
23	Rumk. 1362	7	+29	-33	13 4.4	- 1 20 19	-0.1449	.5514	+1030	9.5021	.9769	
23	B.A.C. 1563	6½	- 4	-71	19 17.0	+ 4 30 53	-0.7219	.5542	+0928	9.5260	.9740	
23	$\alpha$ Tauri	5½	+81	+ 9	20 9.4	+ 5 21 34	+0.6071	.5545	+0913	9.5008	.9771	
24	B.A.C. 1651	6½	+27	-32	2 20.0	+11 19 42	-0.1678	.5573	+0803	9.5272	.9739	
24	B.A.C. 1733	6½	+10	-51	8 4.1	- 7 7 55	-0.4853	.5506	+0704	9.5418	.9720	
24	$\zeta$ Tauri	3½	-33	-69	9 51.2	- 5 24 28	-1.0955	.5600	+0671	9.5555	.9700	
24	B.A.C. 1835	6½	+ 7	-54	14 40.1	- 0 45 34	-0.5345	.5623	+0580	9.5507	.9706	
24	$\chi^1$ Orionis	4½	+51	- 8	17 22.5	+ 1 51 15	+0.2285	.5634	+0531	9.5391	.9723	
24	$\chi^2$ Orionis	6	+90	+25	17 37.7	+ 2 5 53	+0.8065	.5635	+0526	9.5232	.9738	
24	$\chi^3$ Orionis	5	+90	+41	21 24.4	+ 5 44 40	+1.0249	.5648	+0454	9.5274	.9739	
24	$\chi^4$ Orionis	5	+76	+11	21 35.9	+ 5 55 49	+0.5535	.5649	+0450	9.5368	.9726	
25	68 Orionis	6	+90	+43	1 11.1	+ 9 23 28	+1.0450	.5661	+0378	9.5302	.9734	
25	15 <sup>a</sup> Geminor.	8	+46	- 9	8 3.7	- 7 58 26	+0.1466	.5684	+0242	9.5515	.9705	
25	15 <sup>b</sup> Geminor.	6	+45	-10	8 4.2	- 7 57 57	+0.1384	.5684	+0242	9.5517	.9705	
25	16 Geminor.	6	+67	+ 7	8 9.1	- 7 53 15	+0.4550	.5684	+0241	9.5457	.9714	
25	$\nu$ Geminor.	4½	+90	+45	8 36.1	- 7 27 14	+0.7623	.5685	+0231	9.5400	.9722	
25	$\delta$ Geminor.	6	-12	-68	18 22.6	+ 1 58 23	-0.8233	.5715	+0031	9.5719	.9675	
25	$\zeta$ Gemin.,mul.	4	+61	+ 5	23 49.3	+ 7 13 21	+0.3779	.5728	-0082	9.5495	.9708	
26	56 Geminor.	5½	+58	+ 1	7 29.1	- 9 23 29	+0.3264	.5742	-0244	9.5481	.9710	
26	63 Gemi.,mul.	5½	-11	-68	9 56.3	- 7 1 37	-0.8136	.5746	-0295	9.5681	.9681	
26	85 Geminor.	6½	+52	- 7	21 52.3	+ 4 28 19	+0.2386	.5761	-0547	9.5390	.9724	
27	B.A.C. 2683	6	+90	+43	1 45.5	+ 8 12 55	+1.0688	.5765	-0629	9.5172	.9751	
27	$\delta$ Cancri	6	+90	+34	9 40.0	- 8 9 57	+0.9808	.5770	-0790	9.5071	.9763	
27	$\theta$ Cancri	6	+90	+29	13 9.7	- 4 47 57	+0.9133	.5770	-0861	9.5022	.9769	
27	B.A.C. 2854	6½	+36	-24	13 10.8	- 4 46 53	-0.0112	.5770	-0861	9.5219	.9745	
27	35 Cancri	6½	- 8	-70	14 42.7	- 3 18 18	-0.7762	.5771	-0894	9.5348	.9729	
27	B.A.C. 2886	7½	-22	-70	14 53.4	- 3 8 2	-0.9812	.5771	-0897	9.5386	.9724	
27	B.A.C. 2899	7	+ 6	-57	15 45.3	- 2 18 1	-0.5442	.5771	-0916	9.5281	.9737	
27	B.A.C. 2906	7½	-25	-70	16 19.0	- 1 45 33	-1.0221	.5771	-0927	9.5368	.9726	
27	B.A.C. 2907	8	-19	-70	16 20.3	- 1 44 20	-0.9374	.5771	-0927	9.5350	.9729	
27	38 Cancri	7	-38	-70	16 34.1	- 1 31 1	-1.1519	.5771	-0932	9.5389	.9723	
27	B.A.C. 2914	7	-17	-70	16 37.7	- 1 27 33	-0.9206	.5771	-0933	9.5342	.9730	
27	B.A.C. 2913,m	7	-29	-70	16 51.1	- 1 14 38	-1.0678	.5771	-0938	9.5367	.9726	
27	$\epsilon$ Cancri	6½	-17	-70	16 53.1	- 1 12 41	-0.9202	.5771	-0938	9.5341	.9730	
27	42 Cancri	6½	-36	-70	16 59.9	- 1 6 8	-1.1334	.5771	-0940	9.5377	.9725	
27	B.A.C. 2925	6½	-23	-70	17 5.6	- 1 0 40	-0.9986	.5771	-0942	9.5349	.9729	
27	$\delta$ Cancri	4	+56	- 8	18 42.4	+ 0 32 34	+0.3000	.5771	-0974	9.5044	.9766	
28	80 Cancri	6½	-16	-72	6 16.5	+11 41 14	-0.9001	.5768	-1198	9.5032	.9768	
28	83 Cancri	6	-18	-72	9 16.4	- 9 25 26	-0.9374	.5767	-1253	9.4959	.9776	
28	8 Leonis	6½	- 2	-72	16 58.1	- 2 0 43	-0.6931	.5759	-1392	9.4664	.9805	
29	34 Leonis	6	+45	-23	7 45.6	-11 45 28	+0.1379	.5749	-1635	9.3836	.9869	
29	37 Leonis	6	+ 4	-69	9 54.9	- 9 40 52	-0.6022	.5748	-1667	9.3950	.9862	
29	$\iota$ Leonis	5	+42	-28	23 54.4	+ 3 48 12	+0.0897	.5738	-1859	9.2897	.9916	
30	B.A.C. 3837	6½	+69	- 8	10 34.3	- 9 54 58	+0.4984	.5734	-1983	9.1835	.9949	
31	$\nu$ Virginis	4½	- 7	-83	0 17.7	+ 3 18 45	-0.8044	.5730	-2109	9.1018	.9965	
31	B.A.C. 3936	6	+50	-24	1 42.2	+ 4 40 13	+0.2294	.5730	-2118	9.0134	.9976	
31	$\beta$ Virginis	6	+90	+ 5	6 22.1	+ 9 10 4	+0.7581	.5731	-2148	8.8833	.9987	
31	B.A.C. 4104	6½	- 2	-84	11 25.0	- 9 58 0	-0.7281	.5731	-2180	8.9210	.9985	
31	$\epsilon$ Virginis	5	- 8	-86	15 10.4	- 6 20 43	-0.8147	.5732	-2200	8.8480	.9989	
Nov. 4	$\chi$ Ophiuchi	6	+72	+18	22 0.4	- 3 19 33	+0.9307	.5911	-1317	9.4936	.9778	
4	$\phi$ Ophiuchi	5	-42	-90	23 42.8	- 1 41 1	-1.1314	.5912	-1284	9.0448	.9821	
5	24 Scorpii	5	0	-69	3 54.5	+ 2 20 58	-0.4866	.5916	-1200	9.4777	.9794	
5	B.A.C. 5700	6½	+68	+ 1	10 7.8	+ 8 19 54	+0.6668	.5915	-1073	9.5198	.9748	
5	29 Ophiuchi	6	+14	-48	12 5.0	+10 12 36	-0.1864	0.5915	-1032	9.5057	9.9764	

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Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$
Nov. 6	B.A.C. 6081	6½	+ 1	-59	11 38.7	+ 8 52 9	-0.3442	0.5880	-.0511	$\pi$ 9.5408	9.9721
6	B.A.C. 6098	6	+20	-36	12 42.3	+ 9 53 24	+0.0202	.5878	-.0488	$\pi$ 9.5493	.9709
6	$\mu^1$ Sagittarii	4½	+29	-27	17 15.8	- 9 43 32	+0.1874	.5864	-.0385	$\pi$ 9.5563	.9699
6	15 Sagittarii	5	+ 9	-48	17 52.0	- 9 8 41	-0.1713	.5863	-.0371	$\pi$ 9.5496	.9708
6	16 Sagittarii	6	-10	-73	17 52.7	- 9 8 1	-0.5230	.5863	-.0371	$\pi$ 9.5427	.9718
6	21 Sagittarii	5	- 8	-69	22 2.7	- 5 7 29	-0.4688	.5850	-.0367	$\pi$ 9.5465	.9712
7	B.A.C. 6336	6½	+36	-18	3 13.4	- 0 8 27	+0.3439	.5829	-.0163	$\pi$ 9.5641	.9687
7	B.A.C. 6347	6½	+15	-39	3 38.7	+ 0 15 56	-0.0210	.5828	-.0153	$\pi$ 9.5574	.9697
7	29 Sagittarii	6	-28	-90	8 8.8	+ 4 36 0	-0.7839	.5812	-.0053	$\pi$ 9.5437	.9717
7	30 Sagittarii	6	+68	+36	8 36.6	+ 5 2 45	+1.1285	.5810	-.0043	$\pi$ 8.5793	.9662
7	31 Sagittarii	6	+68	+15	9 8.4	+ 5 33 24	+0.8798	.5808	-.0033	$\pi$ 9.5749	.9670
7	33 Sagittarii	6	+32	-20	9 56.2	+ 6 19 24	+0.2987	.5805	-.0016	$\pi$ 9.5644	.9687
7	$\epsilon$ Sagittarii	6	- 8	-65	11 21.2	+ 7 41 16	-0.4227	.5798	+0.0016	$\pi$ 9.5508	.9706
7	$\zeta$ Sagittarii	4	+18	-34	11 30.2	+ 7 49 54	+0.0489	.5798	+0.0020	$\pi$ 9.5598	.9694
7	$\theta$ Sagittarii	4	+68	+ 6	14 24.7	+10 38 0	+0.7482	.5784	+0.0082	$\pi$ 9.5723	.9674
7	B.A.C. 6539	6	+16	-38	16 4.6	-11 45 47	-0.0089	.5777	+0.0118	$\pi$ 9.5580	.9696
7	$\pi$ Sagittarii	3	+18	-35	16 34.9	-11 16 35	+0.0374	.5775	+0.0129	$\pi$ 9.5588	.9695
7	B.A.C. 6561	6	+68	+ 5	17 2.5	-10 51 34	+0.7280	.5773	+0.0139	$\pi$ 9.5711	.9676
7	50 Sagittarii	6	+68	+27	23 36.9	- 4 30 2	+1.0332	.5741	+0.0278	$\pi$ 9.5743	.9671
8	B.A.C. 6671	6	+58	- 2	1 35.4	- 2 35 46	+0.6131	.5732	+0.0320	$\pi$ 9.5656	.9685
8	$f$ Sagittarii	5	-20	-90	8 19.7	+ 3 54 4	-0.7201	.5692	+0.0455	$\pi$ 9.5355	.9728
8	$\sigma$ Capricor.	5½	- 2	-66	22 56.7	- 6 0 26	-0.4381	.5694	+0.0732	$\pi$ 9.5240	.9742
9	$\pi$ Capricor.	5	-44	-90	2 31.3	- 2 32 27	-1.1122	.5585	+0.0797	$\pi$ 9.5045	.9766
9	$\sigma$ Capri., mult.	6	-11	-83	3 40.9	- 1 25 17	-0.6177	.5578	+0.0817	$\pi$ 9.5127	.9757
9	$\nu$ Capricor.	5½	-13	-89	8 19.1	+ 3 3 28	-0.6680	.5550	+0.0898	$\pi$ 9.5036	.9767
9	B.A.C. 7202	6	+12	-51	12 9.8	+ 6 46 23	-0.2237	.5528	+0.0960	$\pi$ 9.5054	.9765
9	B.A.C. 7209	6½	+ 5	-61	12 35.6	+ 7 11 25	-0.3568	.5525	+0.0965	$\pi$ 9.5018	.9770
9	19 Capricor.	6	+13	-50	15 8.0	+ 9 38 39	-0.2144	.5509	+1.008	$\pi$ 9.4995	.9772
9	20 Capricor.	6	+71	+47	17 20.8	+11 47 7	+1.2277	.5493	+1.044	$\pi$ 9.5243	.9742
9	21 Capricor.	6	+ 8	-58	17 58.0	-11 36 57	-0.3292	.5489	+1.054	$\pi$ 9.4909	.9781
9	$\theta$ Capricor.	4	+ 5	-62	20 20.9	- 9 18 42	-0.3855	.5475	+1.090	$\pi$ 9.4841	.9788
10	30 Capricor.	6	+72	+31	2 1.4	- 3 49 18	+1.1023	.5441	+1.175	$\pi$ 9.5021	.9769
10	31 Capricor.	6½	+61	- 6	2 10.6	- 3 40 23	+0.5545	.5440	+1.177	$\pi$ 9.4901	.9782
10	$\iota$ Capricor.	4½	+33	-31	4 5.5	- 1 49 15	+0.1126	.5428	+1.205	$\pi$ 9.4754	.9797
10	$\gamma$ Capricor.	3½	+73	+26	12 42.0	+ 6 30 49	+1.0529	.5381	+1.320	$\pi$ 9.4720	.9800
10	44 Capricor.	6	-47	-90	14 12.4	+ 7 58 26	-1.2028	.5371	+1.340	$\pi$ 9.4128	.9849
10	45 Capricor.	6	-13	-90	14 39.8	+ 8 24 54	-0.7568	.5369	+1.346	$\pi$ 9.4227	.9843
10	$\delta$ Capricor.	3	+73	+17	16 6.1	+ 9 48 31	+0.9311	.5361	+1.365	$\pi$ 9.4589	.9813
11	$\iota$ Aquarii	4	+24	-44	1 45.9	- 4 49 42	-0.1141	.5310	+1.479	$\pi$ 9.3986	.9859
11	42 Aquarii	6	+ 7	-66	6 59.5	+ 0 14 21	-0.4459	.5283	+1.536	$\pi$ 9.3675	.9879
11	45 Aquarii	6	+45	-24	8 6.1	+ 1 18 57	+0.2475	.5278	+1.548	$\pi$ 9.3823	.9870
11	50 Aquarii	6	+76	+16	10 51.6	+ 3 59 27	+0.9356	.5265	+1.575	$\pi$ 9.3894	.9866
11	B.A.C. 7835	6½	+76	+ 3	13 42.2	+ 6 44 55	+0.7199	.5251	+1.634	$\pi$ 9.3707	.9877
11	70 Aquarii	6	+18	-54	23 15.9	- 7 58 25	-0.2778	.5210	+1.690	$\pi$ 9.2899	.9916
12	$\psi^1$ Aquarii	4½	+76	- 3	13 37.3	+ 5 57 54	+0.6336	.5161	+1.800	$\pi$ 9.2308	.9936
12	$\chi$ Aquarii	5½	- 8	-90	14 10.1	+ 6 23 47	-0.7736	.5159	+1.803	$\pi$ 9.1664	.9953
12	$\psi^2$ Aquarii	4½	+80	+16	14 43.0	+ 7 1 45	+0.9378	.5158	+1.837	$\pi$ 9.2350	.9935
12	B.A.C. 8214	6½	+82	+ 5	0 7.5	- 7 49 55	+0.7738	.5131	+1.860	$\pi$ 9.1534	.9956
13	B.A.C. 8274	6½	+83	+13	7 6.6	- 1 2 38	+0.8888	.5118	+1.896	$\pi$ 9.0923	.9967
13	27 Piscium	5½	-37	-90	12 35.2	+ 4 16 39	-1.1978	.5112	+1.917	$\pi$ 8.8729	.9988
14	B.A.C. 81	6½	+39	-35	2 35.7	- 6 6 20	+0.0370	.5098	+1.962	$\pi$ 8.7098	.9994
14	14 Ceti	6½	0	-87	8 35.6	- 0 16 43	-0.6877	.5097	+1.974	$\pi$ 8.3290	.9999
14	15 Ceti	6½	+15	-63	9 58.8	+ 1 4 24	-0.4152	.5096	+1.976	$\pi$ 8.3282	.9999
14	26 Ceti, mult.	6½	+52	-23	23 56.9	- 9 20 56	+0.2697	.5106	+1.986	8.0665	0.0000
15	29 Ceti	6½	+37	-37	2 12.5	- 7 9 10	-0.0045	0.5110	+1.984	8.3596	9.9999

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$y'$	Log sin $\delta'$	Log cos $\delta'$
Nov. 15	33 Ceti	6	+26	-49	3 36.4	- 5 47 37	-0.2157	0.5111	+1983	8.4854	9.9998
15	35 Ceti	6½	+35	-39	4 40.6	- 4 45 14	-0.0376	.5112	+1982	8.4930	.9998
15	f Piscium	6	- 3	-83	7 31.0	- 1 59 33	-0.7435	.5117	+1980	8.7083	.9994
15	v Piscium	4½	+19	-57	20 12.7	+10 20 38	-0.3448	.5143	+1955	8.9250	.9985
16	64 Ceti	6½	- 4	-80	12 4.1	+ 1 44 47	-0.7454	.5188	+1892	9.1414	.9958
16	f Ceti	4½	-12	-82	12 55.2	+ 2 34 27	-0.8872	.5191	+1888	9.1560	.9955
16	B.A.C. 741	6½	- 3	-80	18 55.5	+ 8 24 14	-0.7396	.5213	+1858	9.2003	.9945
16	f Ceti	4½	+90	+22	20 50.8	+10 16 15	+0.9906	.5221	+1870	9.1367	.9959
17	B.A.C. 830	6	+26	-46	4 13.4	- 6 34 16	-0.2045	.5251	+1798	9.2475	.9931
17	$\mu$ Ceti	5	+90	+ 4	5 28.5	- 5 21 23	+0.7023	.5256	+1789	9.2204	.9939
17	B.A.C. 987	6½	+23	-48	18 51.4	+ 7 37 29	-0.2543	.5315	+1678	9.3371	.9895
18	B.A.C. 1272	6	-12	-73	22 28.6	+10 22 50	-0.8574	.5452	+1365	9.4656	.9806
18	Lal. 7671	8	- 6	-73	22 47.4	+10 41 1	-0.7683	.5454	+1361	9.4645	.9807
18	Lal. 7677	8	- 5	-73	22 52.5	+10 45 57	-0.7556	.5454	+1360	9.4645	.9807
18	Lal. 7702	9½	+ 5	-65	23 8.4	+11 1 20	-0.5795	.5455	+1357	9.4614	.9810
18	Lal. 7753	7½	+90	+18	23 54.2	+11 45 45	+0.8385	.5459	+1348	9.4297	.9837
18	B.A.C. 1281	7	+42	-24	23 57.3	+11 48 41	+0.0847	.5459	+1347	9.4483	.9822
19	Rumk. 1103	7	+90	+47	0 1.8	+11 53 1	+1.2012	.5460	+1346	9.4210	.9844
19	Rumk. 1110	7	+ 9	-59	0 37.8	-11 32 7	-0.5125	.5465	+1338	9.4644	.9808
19	Rumk. 1136	6	+90	+22	2 41.7	- 9 32 10	+0.8997	.5475	+1309	9.4373	.9831
19	Lal. 8031	9	- 4	-73	3 31.3	- 8 44 17	-0.7290	.5479	+1297	9.4779	.9794
19	55 Tauri	7	+90	+13	4 8.8	- 8 7 57	+0.7437	.5483	+1289	9.4457	.9824
19	Lal. 8122	9	-28	-72	4 48.6	- 7 20 24	-1.0664	.5486	+1277	9.4889	.9783
19	Rumk. 1161	9	+20	-45	4 51.1	- 7 27 0	-0.3120	.5486	+1276	9.4725	.9800
19	Rumk. 1162	6	-44	-72	4 51.8	- 7 26 23	-1.2221	.5486	+1276	9.4925	.9779
19	Rumk. 1163	8	+73	+ 1	4 54.7	- 7 23 30	+0.5301	.5486	+1275	9.4531	.9817
19	$\delta$ Tauri	4	+27	-38	5 32.8	- 6 46 43	-0.1912	.5489	+1268	9.4717	.9801
19	63 Tauri	6	+88	+ 9	5 47.5	- 6 32 27	+0.6659	.5491	+1264	9.4526	.9818
19	B.A.C. 1351	6½	+90	+19	5 49.2	- 6 30 50	+0.8301	.5491	+1264	9.4488	.9821
19	$\delta$ Tauri	6	+36	-29	6 5.7	- 6 14 53	-0.0194	.5492	+1260	9.4693	.9803
19	Lal. 8249	7½	+62	- 7	6 13.6	- 6 7 10	+0.3907	.5493	+1258	9.4604	.9811
19	Lal. 8256	8	+81	+ 5	6 16.5	- 6 4 23	+0.6070	.5493	+1257	9.4554	.9816
19	$\sigma$ Tauri	5	+11	-55	6 44.3	- 5 37 29	-0.4674	.5495	+1250	9.4812	.9791
19	Rumk. 1189	9	+90	+14	7 11.6	- 5 11 8	+0.7502	.5498	+1244	9.4547	.9816
19	Rumk. 1192	9	+65	- 4	7 15.8	- 5 6 58	+0.4314	.5498	+1242	9.4623	.9809
19	Rumk. 1197	9	- 1	-71	7 29.2	- 4 54 2	-0.6802	.5499	+1239	9.4879	.9784
19	Rumk. 1212	6	+47	-18	8 33.2	- 3 52 12	+0.1600	.5504	+1222	9.4722	.9800
19	Rumk. 1214	9	+27	-37	8 37.3	- 3 48 15	-0.1756	.5504	+1221	9.4798	.9792
19	Rumk. 1215	7	+27	-38	8 37.9	- 3 47 39	-0.1895	.5504	+1221	9.4806	.9792
19	Rumk. 1233	9	+37	-27	10 6.6	- 2 21 53	-0.0036	.5512	+1199	9.4800	.9792
19	Lal. 8599	9	+51	-15	11 3.2	- 1 27 8	+0.2215	.5516	+1184	9.4775	.9796
19	Lal. 8610	8	+90	+35	11 12.2	- 1 18 22	+1.0505	.5517	+1182	9.4591	.9813
19	Lal. 8613	8	+90	+20	11 13.7	- 1 16 57	+0.8348	.5517	+1182	9.4642	.9808
19	Lal. 8678	8	+ 9	-58	12 13.0	- 0 19 35	-0.5057	.5522	+1167	9.4964	.9775
19	89 Tauri	7	+90	+47	12 42.4	+ 0 8 47	+1.1795	.5525	+1160	9.4602	.9812
19	Lal. 8714	9	+ 1	-67	12 48.7	+ 0 14 54	-0.6460	.5525	+1158	9.5008	.9771
19	Rumk. 1246	7	+90	+27	14 14.9	+ 1 38 14	+0.9367	.5532	+1136	9.4698	.9802
19	Rumk. 1251	9	+ 5	-62	14 24.3	+ 1 47 22	-0.5812	.5533	+1134	9.5033	.9768
19	Rumk. 1258	6	+14	-51	14 49.0	+ 2 11 12	-0.4194	.5535	+1127	9.5009	.9771
19	Lal. 8852	9½	+90	+41	14 54.7	+ 2 16 42	+1.1143	.5535	+1126	9.4674	.9805
19	Lal. 8914	8	-18	-71	16 4.1	+ 3 23 52	-0.9410	.5541	+1107	9.5145	.9755
19	Lal. 8927	8½	- 4	-71	16 14.2	+ 3 33 35	-0.7594	.5542	+1104	9.5111	.9759
19	Rumk. 1269	6½	+18	-46	16 18.8	+ 3 38 4	-0.3453	.5542	+1103	9.5028	.9768
19	Lal. 8933	9	- 3	-71	16 19.0	+ 3 38 14	-0.7061	.5542	+1103	9.5103	.9760
19	B.A.C. 1468	6	+22	-41	16 24.0	+ 3 43 4	-0.2675	0.5543	+1102	9.5014	9.9770

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$\gamma'$	Log sin $\delta$	Log cos $\delta$
Nov. 19	Rumk. 1276		+35	-23	16 47.9	+ 4 6 9	+0.0414	0.5544	+1.095	9.4958	9.9776
19	B.A.C. 1478	7½	+29	-33	17 30.7	+ 4 47 28	-0.1394	.5547	+1.084	9.5013	.9770
19	i Tauri	5½	+29	-33	18 44.7	+ 5 59 4	-0.1419	.5554	+1.064	9.5040	.9766
19	Rumk. 1300		+90	+49	19 2.4	+ 6 16 10	+1.1844	.5556	+1.059	9.4769	.9796
19	Rumk. 1301	6	+31	-31	19 3.4	+ 6 17 10	-0.1083	.5556	+1.059	9.5040	.9766
19	Rumk. 1302	7	+37	-26	19 4.0	+ 6 17 45	-0.0123	.5556	+1.059	9.5021	.9769
20	B.A.C. 1563	6½	+ 5	-60	1 12.1	-11 46 37	-0.5740	.5585	+0.955	9.5261	.9740
20	m Tauri	5½	+90	+17	2 3.6	-10 56 49	+0.7506	.5589	+0.940	9.5008	.9771
20	l Tauri	5½	-37	-70	2 13.2	-10 47 33	-1.1447	.5590	+0.937	9.5391	.9723
20	B.A.C. 1651	6½	+37	-24	8 10.0	- 5 2 56	-0.0095	.5616	+0.834	9.5272	.9739
20	B.A.C. 1733	6½	+19	-40	13 50.0	+ 0 25 21	-0.3158	.5638	+0.729	9.5418	.9720
20	ζ Tauri	3½	-18	-69	15 35.9	+ 2 7 34	-0.9210	.5645	+0.696	9.5555	.9700
20	B.A.C. 1835	6½	+17	-41	20 21.5	+ 6 43 11	-0.3538	.5663	+0.605	9.5507	.9705
20	χ¹ Orionis	4½	+64	+ 2	23 2.1	+ 9 18 12	+0.4118	.5673	+0.574	9.5392	.9723
20	χ² Orionis	6	+90	+37	23 17.1	+ 9 32 41	+0.9890	.5674	+0.569	9.5282	.9737
21	χ³ Orionis	5	+90	+58	3 1.4	-10 50 58	+1.2134	.5688	+0.474	9.5275	.9738
21	χ¹ Orionis	5	+90	+22	3 12.8	-10 39 55	+0.7430	.5689	+0.470	9.5369	.9726
21	68 Orionis	6	+90	+62	6 44.8	- 7 15 27	+1.2394	.5701	+0.400	9.5302	.9734
21	15¹ Geminor.	8	+60	+ 2	13 34.7	- 0 40 11	+0.3534	.5719	+0.258	9.5515	.9705
21	15² Geminor.	6	+59	+ 1	13 35.1	- 0 39 42	+0.3449	.5720	+0.258	9.5516	.9705
21	16 Geminor.	6	+90	+15	13 40.0	- 0 35 3	+0.6613	.5720	+0.256	9.5457	.9714
21	ν Geminor.	4½	+90	+39	14 6.7	- 0 9 15	+0.9692	.5721	+0.248	9.5401	.9722
21	δ Geminor.	6	+ 3	-55	23 48.8	+ 9 11 55	-0.6071	.5741	+0.045	9.5719	.9675
22	ζ Gemin.,mul.	4	+82	+17	5 13.7	- 9 34 57	+0.6060	.5749	-0.070	9.5496	.9708
22	δ Gemin.,mul.	3½	-27	-68	12 2.6	- 3 0 56	-1.0313	.5756	-0.215	9.5776	.9665
22	56 Geminor.	5	+78	+13	12 51.7	- 2 13 36	+0.5639	.5757	-0.232	9.5481	.9710
22	63 Gemin.,mul.	5½	+ 4	-54	15 18.5	+ 0 7 54	-0.5753	.5761	-0.286	9.5680	.9681
22	URANUS		-59	-68	21 23.0	+ 5 59 6	-1.2636	.5763	-0.412	9.5767	.9667
23	85 Geminor.	6½	+71	+ 7	3 14.5	+11 37 46	+0.4911	.5762	-0.538	9.5380	.9724
23	B.A.C. 2788	6½	-39	-69	13 44.7	- 2 14 59	-1.1633	.5755	-0.756	9.5574	.9697
23	d¹ Cancri	6	+90	+60	15 5.1	- 0 57 32	+1.2474	.5754	-0.783	9.5071	.9763
23	θ Cancri	6	+90	+51	18 36.3	+ 2 25 59	+1.1820	.5751	-0.855	9.5022	.9769
23	B.A.C. 2854	6½	+53	- 9	18 37.4	+ 2 27 4	+0.2520	.5751	-0.855	9.5218	.9745
23	35 Cancri	6½	+ 8	-55	20 10.1	+ 3 56 23	-0.5171	.5750	-0.885	9.5348	.9729
23	B.A.C. 2886	7½	- 4	-70	20 20.8	+ 4 6 45	-0.7236	.5750	-0.889	9.5385	.9724
23	B.A.C. 2899	7	+21	-40	21 13.2	+ 4 57 13	-0.2829	.5749	-0.905	9.5281	.9737
23	B.A.C. 2906	7½	- 6	-70	21 47.2	+ 5 30 0	-0.7640	.5748	-0.916	9.5367	.9726
23	B.A.C. 2907	8	- 1	-67	21 48.5	+ 5 31 13	-0.6784	.5748	-0.918	9.5350	.9729
23	38 Cancri	7	-15	-70	22 2.4	+ 5 44 40	-0.8946	.5748	-0.923	9.5389	.9723
23	B.A.C. 2914	7	0	-66	22 6.6	+ 5 47 10	-0.6616	.5748	-0.924	9.5342	.9730
23	40 Cancri	6	-34	-70	22 14.5	+ 5 56 19	-1.1156	.5747	-0.927	9.5428	.9718
23	B.A.C. 2919,m	7	-10	-70	22 19.6	+ 6 1 13	-0.8093	.5747	-0.929	9.5367	.9726
23	ε Cancri	6½	- 2	-68	22 21.7	+ 6 3 11	-0.6825	.5747	-0.930	9.5341	.9730
23	42 Cancri	6½	-14	-70	22 28.5	+ 6 9 47	-0.8754	.5747	-0.932	9.5377	.9725
23	B.A.C. 2925	6½	- 5	-70	22 34.2	+ 6 15 18	-0.7398	.5747	-0.933	9.5348	.9729
23	B.A.C. 2931	7	-40	-70	22 56.9	+ 6 37 6	-1.0837	.5746	-0.940	9.5409	.9721
24	δ Cancri	4	+77	+ 7	0 12.0	+ 7 49 29	+0.5688	.5745	-0.964	9.5044	.9766
24	80 Cancri	6½	+ 1	-67	11 54.7	- 4 53 10	-0.6372	.5727	-1.186	9.5032	.9768
24	83 Cancri	6	- 1	-70	14 57.4	- 1 57 2	-0.6747	.5720	-1.239	9.4959	.9776
24	8 Leonis	6½	+14	-53	22 47.2	+ 5 35 56	-0.4277	.5704	-1.378	9.4664	.9805
25	34 Leonis	6	+63	- 9	13 54.5	- 3 49 7	+0.4106	.5672	-1.618	9.3836	.9869
25	37 Leonis	6	+21	-51	16 7.3	- 1 41 1	-0.3403	.5668	-1.643	9.3950	.9862
26	l Leonis	5	+59	-14	6 30.7	-11 47 56	+0.3534	.5646	-1.839	9.2896	.9916
26	B.A.C. 3837	6½	+90	+ 7	17 31.4	- 1 10 19	+0.7586	.5628	-1.958	9.1835	.9949
27	ν Virginis	4½	+ 6	-74	7 43.8	-11 27 30	-0.5825	0.5618	-2.079	9.1017	9.9965

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Date.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$\alpha'$	$y'$	Log sin $\delta'$	Log cos $\delta'$
<b>1869.</b>											
Nov. 27	B.A.C. 3996	6	+67	-11	9 11.4	-10 2 55	+0.4666	0.5618	-2088	9.0132	9.9976
27	<i>b</i> Virginis	6	+90	+20	14 1.7	-5 22 40	+0.9970	.5617	-2121	8.8832	.9987
27	B.A.C. 4104	6½	+9	-70	19 15.9	-0 19 23	-0.5229	.5616	-2149	8.9209	.9985
27	<i>c</i> Virginis	5	+4	-79	23 9.7	+3 26 25	-0.6177	.5617	-2166	8.8479	.9989
29	80 Virginis	6	+85	+11	8 26.4	+11 33 30	+0.8694	.5670	-2179	8.9164	.9985
30	$\epsilon$ Libræ	6	+60	-13	18 22.6	-3 43 16	+0.4386	.5780	-1931	9.2946	.9914
30	$\epsilon$ Libræ	6	+21	-51	19 23.4	-2 44 41	-0.2401	.5783	-1920	9.2759	.9921
30	18 Libræ, <i>mul.</i>	6½	-3	-88	20 18.1	-1 52 1	-0.6781	.5786	-1909	9.2654	.9925
Dec. 4	$\mu^1$ Sagittarii	4	+21	-35	3 36.3	+2 25 12	+0.0484	.5923	-0.049	9.5560	.9699
4	15 Sagittarii	5	+2	-57	4 12.0	+2 59 27	-0.3094	.5922	-0.0395	9.5496	.9708
4	16 Sagittarii	6	-18	-89	4 12.7	+3 0 6	-0.6597	.5922	-0.0395	9.5427	.9718
4	21 Sagittarii	5	-16	-83	8 18.7	+6 56 41	-0.6134	.5912	-0.0302	9.5465	.9712
4	B.A.C. 6336	6½	+27	-27	13 24.0	+11 50 19	+0.1851	.5892	-0.0184	9.5641	.9687
4	B.A.C. 6347	6½	+7	-48	13 49.9	-11 44 45	-0.1782	.5891	-0.0173	9.5574	.9697
4	28 Sagittarii	6	+68	+44	16 49.3	-8 52 13	+1.1923	.5882	-0.0103	9.5833	.9655
4	29 Sagittarii	6	-38	-90	18 13.9	-7 30 47	-0.9441	.5877	-0.0072	9.5437	.9717
4	30 Sagittarii	6	+68	+21	18 40.3	-7 5 24	+0.9546	.5876	-0.0061	9.5793	.9662
4	31 Sagittarii	6	+66	+3	19 12.4	-6 34 32	+0.7065	.5874	-0.0050	9.5749	.9670
4	33 Sagittarii	6	+22	-30	19 59.2	-5 49 30	+0.1280	.5871	-0.0032	9.5644	.9687
4	$\epsilon^1$ Sagittarii	6	+42	-12	21 22.5	-4 29 20	+0.4455	.5865	.0000	9.5508	.9706
4	$\epsilon^2$ Sagittarii	4	+8	-45	21 31.3	-4 20 53	-0.1227	.5864	+0.0003	9.5598	.9694
5	$\sigma$ Sagittarii	4	+52	-5	0 22.3	-1 36 22	+0.5661	.5854	+0.0068	9.5723	.9674
5	B.A.C. 6539	6	+6	-49	2 0.1	-0 2 15	-0.1878	.5850	+0.0104	9.5580	.9696
5	$\pi$ Sagittarii	3	+8	-46	2 29.7	+0 26 18	-0.1427	.5848	+0.0115	9.5538	.9695
5	B.A.C. 6561	6	+50	-6	3 36.9	+1 30 58	+0.5407	.5843	+0.0140	9.5711	.9676
5	50 Sagittarii	6	+68	+13	9 22.4	+7 3 33	+0.8333	.5818	+0.0266	9.5743	.9671
5	B.A.C. 6671	6	+42	-14	11 18.3	+8 55 6	+0.4136	.5808	+0.0306	9.5656	.9685
5	<i>f</i> Sagittarii	5	-33	-90	17 53.2	-8 44 29	-0.9179	.5770	+0.0448	9.5355	.9728
6	B.A.C. 6889	6	+68	+44	1 48.8	-1 6 6	+1.1937	.5725	+0.0611	9.5675	.9682
6	$\sigma$ Capricor.	5½	-14	-89	8 8.2	+4 59 47	-0.6575	.5686	+0.0733	9.5240	.9742
6	$\sigma$ Capri., <i>mult.</i>	6	-24	-90	12 46.2	+9 27 56	-0.8412	.5655	+0.0817	9.5127	.9757
6	$\nu$ Capricor.	5½	-27	-90	17 17.6	-10 10 5	-0.8962	.5624	+0.0900	9.5036	.9767
6	B.A.C. 7202	6	0	-68	21 2.7	-6 32 46	-0.4601	.5600	+0.0966	9.5054	.9765
6	B.A.C. 7209	6½	-8	-80	21 27.9	-6 8 23	-0.5923	.5597	+0.0973	9.5018	.9770
6	19 Capricor.	6	0	-67	23 56.6	-3 44 48	-0.4539	.5581	+0.1015	9.4995	.9772
7	20 Capricor.	6	+71	+21	2 6.2	-1 39 34	+0.9714	.5567	+0.1051	9.5243	.9742
7	21 Capricor.	6	-5	-77	2 42.6	-1 4 26	-0.5705	.5564	+0.1060	9.4909	.9781
7	$\theta$ Capricor.	4	-8	-84	5 2.2	+1 10 27	-0.6285	.5547	+0.1098	9.4841	.9788
7	30 Capricor.	6	+72	+11	10 34.8	+6 31 59	+0.8410	.5510	+0.1184	9.5021	.9769
7	31 Capricor.	6½	+44	-21	10 43.9	+6 40 42	+0.2982	.5509	+0.1186	9.4901	.9782
7	$\iota$ Capricor.	4½	+19	-46	12 36.1	+8 29 15	-0.1415	.5496	+0.1212	9.4754	.9797
7	$\gamma$ Capricor.	3½	+73	+7	21 1.5	-7 21 52	+0.7848	.5440	+0.1333	9.4720	.9800
7	45 Capricor.	6	-30	-90	22 56.8	-5 30 15	-1.0106	.5428	+0.1359	9.4227	.9843
8	$\delta$ Capricor.	3	+71	0	0 21.4	-4 8 23	+0.6620	.5418	+0.1378	9.4589	.9813
8	$\iota$ Aquarii	4	+10	-61	9 50.0	+5 2 13	-0.3790	.5357	+0.1493	9.3986	.9859
8	42 Aquarii	6	-8	-90	14 58.1	+10 0 46	-0.7099	.5325	+0.1550	9.3675	.9879
8	45 Aquarii	6	+30	-36	16 3.7	+11 4 15	-0.0222	.5320	+0.1561	9.3823	.9870
8	50 Aquarii	6	+74	-1	18 46.4	-10 17 58	+0.6600	.5304	+0.1589	9.3894	.9866
8	B.A.C. 7835	6½	+59	-13	21 34.4	-7 35 10	+0.4457	.5287	+0.1616	9.3707	.9877
9	70 Aquarii	6	+4	-74	7 0.0	+1 33 25	-0.5458	.5240	+0.1701	9.2899	.9916
9	74 Aquarii	6	+78	+25	9 33.0	+4 1 49	+1.0585	.5228	+0.1722	9.3287	.9900
9	$\psi^1$ Aquarii	4½	+56	-18	21 12.1	-8 39 36	+0.3625	.5178	+0.1809	9.2308	.9936
9	$\chi$ Aquarii	5½	-25	-90	21 44.6	-8 8 1	-1.0363	.5176	+0.1813	9.1664	.9953
9	$\psi^2$ Aquarii	4½	+78	-1	22 17.2	-7 36 21	+0.6658	.5174	+0.1817	9.2350	.9935
9	$\psi^3$ Aquarii	5	+80	+42	22 50.3	-7 4 12	+1.2382	0.5172	+0.1821	9.2534	9.9929

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of Conj.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$
Dec. 10	B.A.C. 8214	6 $\frac{1}{2}$	+67	-10	7 37.6	+ 1 27 53	+0.5069	0.5138	+1869	$\pi$ 9.1534	9.9956
10	B.A.C. 8274	6 $\frac{1}{2}$	+78	- 3	14 35.1	+ 8 13 31	+0.6277	.5118	+1904	$\pi$ 9.0923	.9967
11	B.A.C. 81	6 $\frac{1}{2}$	+26	-49	10 1.4	+ 3 7 2	-0.2068	.5085	+1968	$\pi$ 8.7100	.9994
11	14 Ceti	6 $\frac{1}{2}$	-15	-90	16 1.4	+ 8 56 55	-0.9239	.5082	+1979	$\pi$ 8.3291	.9999
11	15 Ceti	6 $\frac{1}{2}$	+ 2	-83	17 24.9	+10 18 10	-0.6503	.5081	+1981	$\pi$ 8.3283	9.9999
12	26 Ceti, <i>mult.</i>	6 $\frac{1}{2}$	+40	-36	7 25.1	- 0 5 2	+0.0416	.5083	+1990	8.0654	0.0000
12	29 Ceti	6 $\frac{1}{2}$	+25	-50	9 41.2	+ 2 7 13	-0.2201	.5085	+1989	8.3595	9.9999
12	33 Ceti	6	+14	-64	11 5.4	+ 3 29 6	-0.4290	.5086	+1988	8.4853	.9998
12	35 Ceti	6 $\frac{1}{2}$	+24	-52	12 9.8	+ 4 31 44	-0.2498	.5089	+1988	8.4930	.9998
12	$f$ Piscium	6	-16	-87	15 1.0	+ 7 18 7	-0.9506	.5092	+1984	8.7082	.9994
13	$\nu$ Piscium	4 $\frac{1}{2}$	+ 9	-71	3 46.1	- 4 18 18	-0.5331	.5117	+1960	8.9251	.9985
13	64 Ceti	6 $\frac{1}{2}$	-13	-82	19 41.9	+11 10 22	-0.9057	.5164	+1900	9.1414	.9958
13	$\epsilon$ Ceti	4 $\frac{1}{2}$	-23	-82	20 33.3	-11 59 45	-1.0459	.5166	+1897	9.1569	.9955
14	B.A.C. 741	6 $\frac{1}{2}$	-13	-81	2 35.0	- 6 8 29	-0.8878	.5190	+1866	9.2003	.9945
14	$\epsilon$ Ceti	4	+90	+12	4 30.9	- 4 15 59	+0.8443	.5198	+1856	9.1367	.9959
14	B.A.C. 830	6	+19	-54	11 54.9	+ 2 54 58	-0.3357	.5230	+1810	9.2475	.9931
14	$\mu$ Ceti	5	+76	- 3	13 10.2	+ 4 8 5	+0.5720	.5236	+1797	9.2204	.9939
15	B.A.C. 987	6 $\frac{1}{2}$	+18	-54	2 34.6	- 6 51 39	-0.3567	.5301	+1693	9.3371	.9895
15	$f$ Tauri	4	+90	+60	12 16.9	+ 2 32 49	+1.3107	.5356	+1690	9.3349	.9896
16	B.A.C. 1272	6	-15	-73	6 8.1	- 4 9 57	-0.9024	.5461	+1386	9.4656	.9806
16	Lal. 7671	8	- 9	-73	6 26.8	- 3 51 52	-0.8126	.5463	+1382	9.4645	.9807
16	Lal. 7677	8	- 8	-73	6 31.9	- 3 46 57	-0.7998	.5463	+1381	9.4645	.9807
16	Lal. 7702	9 $\frac{1}{2}$	+ 3	-68	6 47.7	- 3 31 39	-0.6241	.5465	+1378	9.4614	.9810
16	Lal. 7753	7 $\frac{1}{2}$	+90	+15	7 33.3	- 2 47 30	+0.7896	.5469	+1366	9.4297	.9837
16	B.A.C. 1281	7	+40	-26	7 36.3	- 2 44 35	+0.0391	.5469	+1365	9.4483	.9822
16	Rumk. 1103	7	+90	+42	7 40.8	- 2 40 16	+1.1511	.5469	+1364	9.4210	.9844
16	Rumk. 1110		+ 7	-63	8 16.6	- 2 5 37	-0.5542	.5473	+1357	9.4644	.9808
16	Rumk. 1136	6	+90	+19	10 19.8	- 0 6 25	+0.8559	.5486	+1320	9.4373	.9831
16	Lal. 8031	9	- 6	-73	11 9.0	+ 0 41 9	-0.7638	.5490	+1316	9.4779	.9794
16	55 Tauri	7	+90	+10	11 46.3	+ 1 17 15	+0.7034	.5493	+1308	9.4457	.9824
16	Lal. 8122	9	-30	-72	12 25.7	+ 1 55 24	-1.0967	.5498	+1300	9.4989	.9783
16	Rumk. 1161		+18	-48	12 28.3	+ 1 57 54	-0.3460	.5498	+1299	9.4725	.9800
16	Rumk. 1162	6	-49	-72	12 29.0	+ 1 58 31	-1.2520	.5498	+1299	9.4925	.9779
16	Rumk. 1163	8	-70	- 1	12 31.9	+ 2 1 23	+0.4920	.5498	+1298	9.4531	.9817
16	$\delta$ Tauri	4	+25	-40	13 9.7	+ 2 37 54	-0.2246	.5503	+1290	9.4717	.9801
16	63 Tauri	6	+83	+ 6	13 24.4	+ 2 52 6	+0.6291	.5505	+1287	9.4526	.9818
16	B.A.C. 1351	6 $\frac{1}{2}$	+90	+16	13 26.0	+ 2 53 42	+0.7925	.5505	+1287	9.4488	.9821
16	$\gamma$ Tauri	6	+34	-31	13 42.4	+ 3 9 32	-0.0523	.5507	+1283	9.4693	.9803
16	Lal. 8249	7 $\frac{1}{2}$	+60	- 9	13 50.3	+ 3 17 12	+0.3562	.5508	+1281	9.4604	.9811
16	Lal. 8256	8	+77	+ 3	13 53.2	+ 3 19 58	+0.5715	.5508	+1280	9.4554	.9816
16	$\rho$ Tauri	5	+10	-58	14 20.7	+ 3 46 38	-0.4971	.5511	+1273	9.4812	.9791
16	Rumk. 1189		+90	+12	14 47.8	+ 4 12 48	+0.7158	.5514	+1266	9.4547	.9816
16	Rumk. 1192		+63	- 6	14 51.1	+ 4 15 56	+0.3986	.5514	+1265	9.4623	.9809
16	Rumk. 1197		- 2	-72	15 5.3	+ 4 29 46	-0.7071	.5515	+1261	9.4879	.9784
16	Rumk. 1212	6	+45	-20	16 8.8	+ 5 31 7	+0.1310	.5521	+1245	9.4722	.9800
16	Rumk. 1214		+26	-38	16 12.8	+ 5 35 2	-0.2028	.5522	+1244	9.4798	.9792
16	Rumk. 1215	7	+24	-40	16 13.5	+ 5 35 38	-0.2345	.5522	+1244	9.4806	.9791
16	Rumk. 1233		+36	-20	17 40.4	+ 6 59 42	-0.0288	.5531	+1223	9.4800	.9792
16	Lal. 8599	9	+49	-16	18 37.6	+ 7 54 58	+0.1969	.5537	+1209	9.4775	.9795
16	Lal. 8610	8	+90	+32	18 46.6	+ 8 3 40	+1.0221	.5538	+1207	9.4591	.9813
16	Lal. 8613	8	+90	+18	18 48.0	+ 8 5 4	+0.8074	.5538	+1206	9.4641	.9808
16	Lal. 8678	8	+ 8	-59	19 46.8	+ 9 1 55	-0.5242	.5543	+1191	9.4964	.9775
16	89 Tauri	7	+90	+44	20 15.9	+ 9 30 2	+1.1532	.5546	+1184	9.4602	.9812
16	Lal. 8714	9	0	-70	20 22.1	+ 9 36 2	-0.6627	.5546	+1182	9.5008	.9771
16	Rumk. 1246	7	+90	+25	21 47.6	+10 58 39	+0.9145	.5555	+1160	9.4698	9.9802

## ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF PLANETS AND STARS BY THE MOON.

Date.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.									
			North- ern.	South- ern.		H	Y	x'	y'	Log sin $\delta'$	Log cos $\delta'$				
1869.															
Dec. 16	Rumk. 1251	6	+ 4	-63	21 57.0	+11 7 42	-0.5948	0.5556	+1.158	9.5033	9.9768				
16	Rumk. 1258	9	+13	-52	22 21.4	+11 31 19	-0.4331	.5558	+1.152	9.5009	.9771				
16	Lal. 8852	9½	+90	+39	22 27.1	+11 36 48	+1.0922	.5558	+1.150	9.4674	.9805				
16	Lal. 8914	8	-19	-71	23 35.8	-11 16 44	-0.9495	.5565	+1.131	9.5145	.9755				
16	Lal. 8927	8½	- 7	-71	23 45.8	-11 7 7	-0.7686	.5566	+1.129	9.5111	.9759				
16	Rumk. 1269	6½	+17	-47	23 50.4	-11 2 40	-0.3567	.5566	+1.128	9.5028	.9768				
16	Lal. 8933	9	- 3	-71	23 50.6	-11 2 31	-0.7154	.5566	+1.128	9.5103	.9760				
16	B.A.C. 1468	6	+22	-42	23 55.5	-10 57 43	-0.2792	.5567	+1.127	9.5014	.9770				
17	Rumk. 1276	7	+39	-24	0 19.2	-10 34 51	+0.0286	.5569	+1.120	9.4958	.9776				
17	B.A.C. 1478	7½	+29	-34	1 1.5	- 9 53 59	-0.1496	.5573	+1.106	9.5013	.9770				
17	$\epsilon$ Tauri	5½	+29	-34	2 14.9	- 8 43 6	-0.1496	.5579	+1.086	9.5040	.9766				
17	Rumk. 1300	5½	+90	+47	2 32.4	- 8 26 11	+1.1695	.5580	+1.081	9.4760	.9796				
17	Rumk. 1301	6	+31	-32	2 33.4	- 8 25 14	-0.1156	.5580	+1.081	9.5040	.9766				
17	Rumk. 1302	7	+36	-27	2 34.0	- 8 24 39	-0.0202	.5580	+1.081	9.5021	.9769				
17	B.A.C. 1563	5½	+ 5	-60	8 37.9	- 2 33 5	-0.5679	.5616	+0.980	9.5261	.9740				
17	$m$ Tauri	5½	+90	+17	9 29.0	- 1 43 45	+0.7513	.5621	+0.966	9.5008	.9771				
17	$l$ Tauri	5½	-35	-70	9 38.4	- 1 34 44	-1.1324	.5622	+0.964	9.5391	.9723				
17	B.A.C. 1651	6½	+38	-23	15 30.6	+ 4 5 21	+0.0071	.5653	+0.855	9.5272	.9739				
17	B.A.C. 1733	6½	+21	-39	21 5.9	+ 9 28 52	-0.2870	.5681	+0.753	9.5418	.9720				
17	$\zeta$ Tauri	3½	-15	-69	22 50.2	+11 9 30	-0.8849	.5690	+0.720	9.5555	.9700				
18	B.A.C. 1835	6½	+20	-69	3 31.4	- 8 19 18	-0.3129	.5712	+0.666	9.5507	.9706				
18	$\chi^1$ Orionis	4½	+67	+ 4	6 9.4	- 5 46 53	+0.4520	.5723	+0.576	9.5392	.9723				
18	$\chi^2$ Orionis	6	+90	+40	6 24.2	- 5 32 39	+1.0252	.5724	+0.571	9.5282	.9737				
18	$\chi^3$ Orionis	5	+90	+64	10 4.7	- 2 0 3	+1.2537	.5741	+0.497	9.5275	.9738				
18	$\chi^4$ Orionis	5	+90	+24	10 15.9	- 1 49 12	+0.7877	.5742	+0.493	9.5369	.9726				
18	15 <sup>i</sup> Geminor.	8	+65	+ 5	20 26.6	+ 7 59 23	+0.4182	.5780	+0.0279	9.5515	.9705				
18	15 <sup>s</sup> Geminor.	6	+64	+ 5	20 27.1	+ 7 59 51	+0.4099	.5780	+0.0279	9.5516	.9705				
18	16 Geminor.	6	+90	+22	20 31.9	+ 8 4 24	+0.7241	.5780	+0.0277	9.5457	.9714				
18	$\nu$ Geminor.	4½	+90	+43	20 58.1	+ 8 29 42	+1.0301	.5781	+0.0268	9.5401	.9722				
19	$\delta$ Geminor.	6	+ 8	-48	6 29.0	- 6 20 20	-0.5183	.5808	+0.061	9.5719	.9675				
19	$\zeta$ Gemin.,mul.	4	+90	+22	11 47.4	- 1 13 43	+0.6934	.5819	-0.055	9.5495	.9708				
19	$\delta$ Gemin.,mul.	3½	-18	-68	18 28.0	+ 5 12 2	-0.9210	.5828	-0.0203	9.5776	.9665				
19	56 Geminor.	5½	+90	+19	19 16.1	+ 5 58 20	+0.6630	.5828	-0.0221	9.5481	.9710				
19	63 Gemi.,mul.	5½	+11	-46	21 40.0	+ 8 16 51	-0.4636	.5830	-0.0273	9.5680	.9681				
20	URANUS	5	-51	-68	2 4.3	-11 28 39	-1.2354	.5831	-0.0367	9.5570	.9698				
20	85 Geminor.	6½	+83	+13	9 21.5	- 4 27 44	+0.6108	.5832	-0.0531	9.5389	.9724				
20	B.A.C. 2788	6½	-25	-69	19 39.5	+ 5 27 15	-1.0186	.5823	-0.0753	9.5574	.9697				
21	B.A.C. 2854	6½	+63	- 2	0 26.9	+10 3 58	+0.3929	.5816	-0.0852	9.5219	.9745				
21	$\eta$ Cancri	6	-37	-69	0 51.1	+10 27 13	-1.1497	.5815	-0.0860	9.5519	.9705				
21	35 Cancri	6½	+16	-45	1 57.9	+11 31 34	-0.3696	.5813	-0.0884	9.5348	.9729				
21	B.A.C. 2886	7½	+ 5	-59	2 8.5	+11 41 47	-0.5745	.5812	-0.0887	9.5385	.9724				
21	B.A.C. 2899	7	+30	-31	2 59.9	-11 28 41	-0.1358	.5810	-0.0906	9.5281	.9737				
21	B.A.C. 2906	7½	+ 3	-62	3 33.4	-10 56 29	-0.6134	.5809	-0.0918	9.5367	.9726				
21	B.A.C. 2907	8	+ 8	-56	3 34.6	-10 55 17	-0.5283	.5809	-0.0918	9.5350	.9729				
21	38 Cancri	3	-19	-70	3 48.3	-10 42 5	-0.9352	.5809	-0.0923	9.5389	.9723				
21	B.A.C. 2914	7	+ 9	-55	3 51.9	-10 38 38	-0.5112	.5809	-0.0924	9.5342	.9730				
21	39 Cancri	6	-13	-70	3 58.0	-10 32 46	-0.9965	.5808	-0.0926	9.5470	.9712				
21	40 Cancri	6	-20	-69	4 0.2	-10 30 39	-0.9625	.5808	-0.0927	9.5428	.9718				
21	B.A.C. 2919,m	7	0	-66	4 5.2	-10 25 51	-0.6579	.5808	-0.0929	9.5367	.9726				
21	$\epsilon$ Cancri	6½	+ 7	-56	4 7.2	-10 23 54	-0.5317	.5808	-0.0930	9.5341	.9730				
21	42 Cancri	6½	- 4	-70	4 13.9	-10 17 25	-0.7233	.5808	-0.0932	9.5377	.9725				
21	B.A.C. 2925	6½	+ 4	-61	4 19.6	-10 12 0	-0.5884	.5808	-0.0934	9.5348	.9729				
21	B.A.C. 2931	7	-18	-70	4 41.8	- 9 50 36	-0.9298	.5807	-0.0941	9.5409	.9721				
21	$\delta$ Cancri	4	+90	+15	5 55.6	- 8 39 29	+0.7143	.5805	-0.0965	9.5044	.9766				
21	80 Cancri	6½	+11	-55	17 27.3	+ 2 26 47	-0.4734	0.5776	-1.1189	9.5032	9.9768				

ELEMENTS FOR FACILITATING THE PREDICTION OF OCCULTATIONS OF  
PLANETS AND STARS BY THE MOON.

Date. 1869.	Star's Name.	Magnitude.	Limiting Parallels.		Wash- ington Mean Time of C.	At Washington Mean Time of Conjunction.					
			North- ern.	South- ern.		H	Y	$x'$	$y'$	Log sin $\delta$	Log cos $\delta$
Dec. 21	83 Cancri	6	+ 9	-58	20 27.5	+ 5 20 23	-0.5078	0.5768	-.1243	9.4959	9.9776
22	8 Leonis	6½	+ 3	-43	4 11.6	-11 12 26	-0.2555	.5745	-.1381	9.4664	.9805
22	34 Leonis	6	+78	+ 1	19 11.4	+ 3 15 4	+0.5917	.5697	-.1618	9.3836	.9869
22	37 Leonis	6	+29	-40	21 23.3	+ 5 22 19	-0.1572	.5690	-.1649	9.3950	.9862
23	1 Leonis	5	+73	- 4	11 45.3	- 4 46 7	+0.5432	.5644	-.1837	9.2806	.9916
23	B.A.C. 3837	6½	+90	+19	22 48.4	+ 5 53 59	+0.9537	.5614	-.1953	9.1834	.9949
24	$\nu$ Virginis	4½	+16	-60	13 8.9	- 4 15 7	-0.3951	.5582	-.2065	9.1015	.9965
24	B.A.C. 3996	6	+85	0	14 37.6	- 2 49 24	+0.6609	.5580	-.2080	9.0131	.9976
24	$\delta$ Virginis	6	+90	+37	19 32.0	+ 1 55 1	+1.1948	.5572	-.2108	8.8830	.9987
25	B.A.C. 4104	6½	+19	-57	0 51.4	+ 7 3 32	-0.3390	.5566	-.2130	8.9207	.9985
25	$\epsilon$ Virginis	5	+14	-64	4 49.6	+10 53 40	-0.4368	.5564	-.2150	8.8477	.9989
26	80 Virginis	6	+85	+22	14 56.7	- 4 8 42	+1.0402	.5578	-.2152	8.9164	.9985
28	$\zeta$ Libræ	6	+69	- 7	1 59.3	+ 5 41 7	+0.5601	.5674	-.1912	9.2946	.9914
28	$\zeta$ Libræ	6	+27	-44	3 2.1	+ 6 41 45	-0.1287	.5678	-.1900	9.2759	.9921
28	18 Libræ, mul.	6½	+ 3	-76	3 58.6	+ 7 36 14	-0.5742	.5681	-.1889	9.2654	.9925
28	B.A.C. 5070	6	-46	-90	14 46.6	- 5 58 54	-1.2451	.5722	-.1757	9.3143	.9906
28	$\gamma$ Libræ	4½	+54	-16	19 43.7	- 1 12 30	+0.3857	.5740	-.1690	9.3942	.9863
28	$\eta$ Libræ	6	+73	+ 1	23 22.0	+ 2 17 56	+0.6964	.5754	-.1637	9.4201	.9845
29	$\theta$ Libræ	4½	+74	+34	3 28.8	+ 6 15 43	+1.1426	.5772	-.1575	9.4492	.9821
29	49 Libræ	5½	+60	- 9	6 16.7	+ 8 57 30	+0.5077	.5782	-.1511	9.4441	.9826
29	$\chi$ Ophiuchi	6	+72	+19	17 24.2	- 4 19 41	+0.9581	.5819	-.1338	9.4936	.9778
29	$\phi$ Ophiuchi	5	-42	-90	19 9.6	- 2 38 7	-1.1402	.5825	-.1305	9.4488	.9821
29	24 Scorpii	5	- 1	-71	23 28.1	+ 1 30 44	-0.5029	.5838	-.1225	9.4777	.9794
30	B.A.C. 5700	6½	+66	- 1	5 50.0	+ 7 38 16	+0.6390	.5857	-.1100	9.5198	.9748
30	29 Ophiuchi	6	+12	-51	7 49.5	+ 9 33 14	-0.2311	.5862	-.1061	9.5057	.9764
31	58 Ophiuchi	5	+68	+59	0 48.2	+ 1 53 23	+1.2715	.5890	-.0695	9.5663	.9684
31	B.A.C. 6081	6½	- 6	-69	7 35.7	+ 8 25 24	-0.4753	.5891	-.0548	9.5408	.9721
31	B.A.C. 6098	6	+13	-44	8 39.3	+ 9 26 35	-0.1137	0.5891	-.0524	9.5490	9.9709

NOTES.—B. A. C., British Association Catalogue.

Lal., Lalande's *Histoire Céleste Française*, Bailey's Ed.

Rumk., Rumker's Catalogue.

Weis., Weisse's *Positiones Medie Stellarum Fixarum*.



## OCCULTATIONS OF PLANETS AND STARS BY THE MOON, VISIBLE AT WASHINGTON, D. C., DURING THE YEAR 1869.

Date.	Star's Name.	Magnitude.	IMMERSION.				EMERSION.				Duration of Oc- cultation.
			Washington		Angle from		Washington		Angle from		
			Sidereal Time.	Mean Time.	North Point.	Ver- tex.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	
Jan. 18	15 Ceti	6½	<sup>h</sup> 4 <sup>m</sup> 6	<sup>h</sup> 8 <sup>m</sup> 13	327	12	<sup>h</sup> 5 <sup>m</sup> 8	<sup>h</sup> 9 <sup>m</sup> 14	83	132	<sup>h</sup> 1 <sup>m</sup> 1
23	Rumk. 1247		0 59	4 46	265	212	2 11	5 58	136	89	1 12
23	Rumk. 1254		1 26	5 12	255	142	2 28	6 15	142	98	1 3
23	Rumk. 1300		8 5	11 51	357	50	8 18	12 4	16	75	0 12
26	g Geminor.	5½	2 59	6 34	246	190	3 56	7 31	116	61	0 57
27	π¹ Cancri	6½	14 50	18 19	231	284	15 37	19 6	96	147	0 47
28	α Leonis	1½	12 25	15 50	258	302	13 30	16 56	56	106	1 5
Feb. 6	21 Sagittarii	5	15 14	18 3	240	204	16 30	19 19	102	79	1 16
15	29 Ceti	6½	4 10	6 26	289	331	5 23	7 39	120	169	1 13
15	33 Ceti	6	6 5	8 21	325	15	6 58	9 14	76	127	0 53
15	35 Ceti ‡	6½	6 59	9 15	290	341	7 59	10 15	108	158	1 0
17	μ Ceti	5	6 48	8 56	280	332	7 56	10 3	112	164	1 7
19	Rumk. 1203		7 59	9 59	256	308	9 3	11 3	120	174	1 4
19	75 Tauri	6	8 2	10 1	268	321	9 10	11 9	107	161	1 8
19	Rumk. 1210		8 43	10 43	197	251	8 55	10 55	177	231	0 12
19	B.A.C. 1391	5	9 37	11 37	186	240	Star 0'0	south of	♄'s	limb.	
19	B.A.C. 1394	7	9 51	11 50	6	59	Star 2'8	north of	♄'s	limb.	
19	Rumk. 1232		10 3	12 3	251	304	10 56	12 55	119	170	0 53
19	B.A.C. 1406‡	7	10 44	12 43	227	278	11 21	13 20	143	193	0 37
19	Rumk. 1238‡	10	11 6	13 5	270	321	11 59	13 58	100	147	0 53
19	α Tauri*	1	11 34	13 34	266	314	12 24	14 24	104	148	0 50
20	119 Tauri‡	5½	12 13	14 8	317	7	12 49	14 44	44	91	0 35
20	120 Tauri*	6	12 40	14 35	302	350	13 22	15 17	59	102	0 42
Mar. 18	Rumk. 1103	7	8 30	8 43	255	309	9 30	9 43	121	174	1 0
23	π¹ Cancri*	6½	16 6	15 58	220	269	16 44	16 37	111	156	0 39
24	α Leonis	1½	14 39	14 28	277	330	15 29	15 18	42	94	0 50
25	χ Leonis	5	14 11	13 56	175	221	14 34	14 19	135	183	0 23
26	10 Virginis	6	16 57	16 38	250	300	17 53	17 33	66	117	0 55
29	ξ¹ Libræ	6	12 59	12 28	267	242	14 10	13 39	40	31	1 11
April 4	ο Capri., mult.	6	17 28	16 33	316	282	18 33	17 38	56	33	1 6
9	B.A.C. 81‡	6½	18 11	16 56	308	257	19 9	17 54	91	41	0 59
15	Rumk. 1300		10 37	9 0	279	332	11 33	9 56	88	138	0 56
18	g Geminor.	5½	13 47	11 58	180	232	13 58	12 9	158	210	0 11
20	7 Leonis, mul.	6½	10 3	8 6	239	255	11 20	9 23	77	118	1 18
20	15 Sagittarii	5	13 48	11 15	275	230	14 55	12 22	63	26	1 7
30	π Sagittarii*	3	14 6	11 29	174	126	Star 0'2	south of	♄'s	limb.	
May 2	21 Capricor.	6	17 27	14 42	315	276	18 34	15 48	62	33	1 6
16	δ¹ Cancri	6	12 3	8 24	344	38	Star 0'3	north of	♄'s	limb.	
23	ξ¹ Libræ	6	12 20	8 13	268	235	13 28	9 21	38	18	1 8
24	49 Libræ	5½	18 12	14 0	280	309	19 20	15 8	54	93	1 8
26	B.A.C. 6098‡	6	22 14	17 54	293	338	23 13	18 53	72	122	0 59
27	33 Sagittarii	6	19 8	14 44	243	249	20 23	15 59	123	144	1 15
31	45 Aquarii	6	17 46	13 7	273	227	19 1	14 21	117	79	1 15
June 16	δ Virginis	6	17 2	11 21	201	252	17 42	12 0	114	165	0 40
20	γ Libræ	4½	16 47	10 49	309	328	17 29	11 31	13	40	0 42
29	B.A.C. 8214	6½	19 44	13 10	247	204	20 40	14 6	160	123	0 56

**OCCULTATIONS OF PLANETS AND STARS BY THE MOON, VISIBLE AT  
WASHINGTON, D. C., DURING THE YEAR 1869.**

Date.	Star's Name.	Magnitude.	IMMERSION.				EMERSION.				Duration of Oc- cultation.
			Washington		Angle from		Washington		Angle from		
			Sideral Time.	Mean Time.	North Point.	Ver- tex.	Sideral Time.	Mean Time.	North Point.	Ver- tex.	
July	4 <i>f</i> Tauri	4	<sup>h</sup> 22 <sup>m</sup> 41	<sup>h</sup> 15 <sup>m</sup> 47	247	194	<sup>h</sup> 23 <sup>m</sup> 27	<sup>h</sup> 16 <sup>m</sup> 34	160°	108°	<sup>h</sup> 0 <sup>m</sup> 46
	15 80 Virginis†	6	19 12	11 36	233	284	20 6	12 30	70	121	0 55
	20 B.A.C. 6098	6	15 18	7 23	292	261	16 26	8 31	45	26	1 8
	20 $\mu^1$ Sagittarii	4	22 13	14 16	254	298	23 14	15 18	113	163	1 1
	20 15 Sagittarii*	5	23 12	15 16	331	21	23 44	15 48	36	86	0 33
	21 $\zeta^2$ Sagittarii	4	15 2	7 3	281	240	16 13	8 14	65	33	1 11
	21 B.A.C. 6539	6	22 1	14 1	302	338	23 8	15 7	76	119	1 6
	21 $\pi$ Sagittarii	3	22 38	14 37	284	324	23 45	15 45	95	142	1 8
	23 21 Capricor.*	6	1 56	17 48	351	40	2 24	18 15	45	95	0 28
	26 $\psi^1$ Aquarii	4½	18 25	10 6	281	233	19 38	11 18	117	75	1 13
	Aug. 2 Runk. 1300		23 5	14 17	326	273	23 51	15 3	63	14	0 46
	14 49 Libræ	5½	19 11	9 37	246	285	20 19	10 45	90	136	1 9
	17 33 Sagittarii*	6	0 4	14 17	188	238	Star 2' 2" south of	D's limb.			
	20 $\iota$ Capricor.	4½	17 57	8 0	326	288	18 54	8 56	55	25	0 57
	21 45 Aquarii	6	23 35	13 33	281	300	0 54	14 51	132	166	1 19
Sept.	29 Runk. 1197		22 13	11 39	251	199	23 0	12 26	145	92	0 47
	29 75 Tauri	6	22 15	11 41	264	212	23 8	12 34	133	79	0 54
	29 Runk. 1232		0 7	13 33	246	192	0 58	14 24	156	104	0 51
	29 Lal. 8610	8	1 49	15 15	286	237	3 11	16 37	116	83	1 22
	29 Lal. 8613	8	2 12	15 37	330	284	3 15	16 41	71	39	1 4
	2 <i>d</i> Cancri	6	2 18	15 28	253	201	3 13	16 23	104	49	0 55
	10 $\gamma$ Libræ†	6	20 58	9 37	237	287	21 51	10 30	102	153	0 53
	20 B.A.C. 81	6½	2 40	14 40	344	17	3 38	15 38	75	117	0 58
	21 33 Ceti	6	5 25	17 20	1	49	5 53	17 48	47	97	0 28
	25 Lal. 7753	7½	22 37	10 17	333	280	23 22	11 2	67	14	0 45
	25 Runk. 1103	7	22 28	10 8	254	201	23 19	10 58	147	93	0 50
	25 Runk. 1136	6	1 45	13 25	270	224	3 3	14 43	135	106	1 18
	25 55 Tauri	7	4 1	15 41	273	268	5 29	17 8	124	156	1 28
	25 Runk. 1123	8	5 25	17 4	307	338	6 46	18 25	83	131	1 21
	26 <i>m</i> Tauri	5½	1 22	12 58	322	267	2 24	14 0	75	24	1 2
	27 $\chi^2$ Orionis†	6	22 37	10 9	320	272	23 17	10 49	62	11	0 41
	27 $\chi^1$ Orionis	5	2 47	14 19	310	256	3 56	15 28	74	27	1 9
	28 $\zeta$ Gemi., <i>mult.</i>	4	5 14	16 41	325	281	6 5	17 32	39	11	0 51
Oct.	10 $\mu^1$ Sagittarii	4	22 41	9 23	4	51	Star 1' 3" north of	D's limb.			
	11 $\sigma$ Sagittarii	4	18 50	5 28	235	234	20 1	6 39	131	145	1 10
	15 B.A.C. 7835	6½	19 3	5 25	268	228	20 22	6 43	131	104	1 18
	16 $\psi^1$ Aquarii	4½	18 58	5 16	295	249	20 15	6 33	106	70	1 17
	23 Lal. 8852.†	9½	21 15	7 5	243	196	21 54	7 43	148	98	0 39
Nov.	24 $\chi^1$ Orionis	4½	7 57	17 41	294	343	9 10	18 55	68	12	1 13
	13 B.A.C. 8274	6½	21 16	5 43	285	252	22 36	7 3	128	111	1 20
	19 Lal. 8256*	8	20 45	4 49	343	297	21 13	5 17	49	0	0 28
	19 Runk. 1189†		21 19	5 23	299	250	22 11	6 15	96	44	0 53
	19 Lal. 8399	9	2 13	10 16	1	314	2 43	10 46	45	4	0 30
	21 15 <sup>1</sup> Geminor.	8	4 34	12 29	271	225	6 0	13 55	103	90	1 26
	21 15 <sup>2</sup> Geminor.	6	4 35	12 30	273	227	6 1	13 56	101	90	1 26
	22 56 Geminor.	5	3 31	11 22	231	174	4 25	12 16	137	82	0 54

## OCCULTATIONS OF PLANETS AND STARS BY THE MOON, VISIBLE AT WASHINGTON, D. C., DURING THE YEAR 1869.

Date.	Star's Name.	Magnitude.	IMMERSION.				EMERSION.				Duration of Oc- culation.
			Washington		Angle from		Washington		Angle from		
			Sidereal Time.	Mean Time.	North Point.	Ver- tex.	Sidereal Time.	Mean Time.	North Point.	Ver- tex.	
Nov. 25	34 Leonis	6	<sup>h</sup> 4 <sup>m</sup> 26	<sup>h</sup> 12 <sup>m</sup> 5	245	192	<sup>h</sup> 5 <sup>m</sup> 26	<sup>h</sup> 13 <sup>m</sup> 5	91°	37°	<sup>h</sup> 1 <sup>m</sup> 0
30	ξ <sup>1</sup> Libræ†	6	9 19	16 37	238	188	10 15	17 34	74	27	0 56
Dec. 10	B.A.C. 8214	6½	0 29	7 10	26	359	Star 3' 0	north of	♂'s	limb.	
14	μ Ceti	5	7 50	14 14	230	282	8 25	14 49	162	214	0 35
16	Lal. 7553	7½	23 25	5 42	268	214	0 26	6 44	137	84	1 2
16	Rumk. 1163	8	6 39	12 56	242	290	7 39	13 56	142	195	1 0
16	63 Tauri	6	8 17	14 33	190	244	Star 1' 1	south of	♂'s	limb.	
16	Lal. 8249	7½	8 20	14 36	277	331	9 27	15 43	100	154	1 8
16	Lal. 8256	8	8 33	14 49	226	280	9 13	15 29	151	205	0 41
16	Rumk. 1189		9 52	16 8	187	242	Star 2' 4	south of	♂'s	limb.	
16	Rumk. 1192		9 21	15 38	242	296	10 28	16 45	138	190	1 7
17	m Tauri	5½	1 57	8 10	221	168	2 26	8 39	177	127	0 29
18	χ <sup>1</sup> Orionis	4½	22 43	4 52	4	315	22 50	4 59	19	330	0 7
20	85 Geminor.	6½	1 42	7 43	212	159	2 16	8 17	152	98	0 34
23	l Leonis	5	4 16	10 5	216	166	4 59	10 48	115	63	0 43

\* Whole occultation below the horizon of Washington.

† Immersion below the horizon of Washington.

‡ Emerison below the horizon of Washington.

The *Angles of Position*, for the points of contact, are for *direct vision*, and are reckoned from the moon's *North Point* and from its *Vertex* towards the West. For *inverted image*, add 180° to the angles given.

# 458 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

JANUARY.

		d	h	m	s			d	h	m	s
I. Transit	Ingress W.*	1	6	28		I. Shadow	Ingress W.	8	9	45	
I. Shadow	Ingress W.	1	7	49		I. Transit	Egress	8	10	40	
I. Transit	Egress W.	1	8	43		I. Shadow	Egress	8	11	59	
I. Shadow	Egress W.	1	10	3		II. Transit	Ingress	8	13	48	
II. Transit	Ingress	1	11	6		II. Transit	Egress	8	16	22	
II. Transit	Egress	1	13	41		II. Shadow	Ingress	8	16	30	
II. Shadow	Ingress	1	13	51		II. Shadow	Egress	8	18	57	
II. Shadow	Egress	1	16	19		I. Occult.	Disapp. W.	9	5	45	
I. Occult.	Disapp.	2	3	47		I. Eclipse	Reapp. W.	9	9	16	7.4
I. Eclipse	Reapp. W.	2	7	20	15.1	I. Transit	Ingress	10	2	54	
I. Transit	Ingress	3	0	57		I. Shadow	Ingress	10	4	14	
I. Shadow	Ingress	3	2	18		I. Transit	Egress	10	5	9	
I. Transit	Egress	3	3	12		I. Shadow	Egress W.	10	6	28	
I. Shadow	Egress	3	4	32		II. Occult.	Disapp. W.	10	8	3	
II. Occult.	Disapp. W.	3	5	22		II. Occult.	Reapp.	10	10	37	
II. Occult.	Reapp. W.	3	7	56		II. Eclipse	Disapp.	10	10	46	17.4
II. Eclipse	Disapp. W.	3	8	9	25.9	II. Eclipse	Reapp.	10	13	6	51.0
II. Eclipse	Reapp. W.	3	10	30	14.5	III. Transit	Ingress	10	19	12	
III. Transit	Ingress	3	15	3		III. Transit	Egress	10	22	10	
III. Transit	Egress	3	18	2		I. Occult.	Disapp.	11	0	14	
III. Shadow	Ingress	3	20	38		III. Shadow	Ingress	11	0	41	
I. Occult.	Disapp.	3	22	16		III. Shadow	Egress	11	3	18	
III. Shadow	Egress	3	23	17		I. Eclipse	Reapp.	11	3	45	2.8
I. Eclipse	Reapp.	4	1	49	11.2	I. Transit	Ingress	11	21	23	
I. Transit	Ingress	4	19	26		I. Shadow	Ingress	11	22	43	
I. Shadow	Ingress	4	20	47		I. Transit	Egress	11	23	38	
I. Transit	Egress	4	21	41		I. Shadow	Egress	12	0	57	
I. Shadow	Egress	4	23	1		II. Transit	Ingress	12	3	10	
II. Transit	Ingress	5	0	27		II. Transit	Egress W.	12	5	44	
II. Transit	Egress	5	3	1		II. Shadow	Ingress W.	12	5	49	
II. Shadow	Ingress	5	3	11		II. Shadow	Egress W.	12	8	16	
II. Shadow	Egress W.	5	5	38		I. Occult.	Disapp.	12	18	44	
I. Occult.	Disapp.	5	16	46		I. Eclipse	Reapp.	12	22	14	3.9
I. Eclipse	Reapp.	5	20	18	15.0	I. Transit	Ingress	13	15	53	
I. Transit	Ingress	6	13	55		I. Shadow	Ingress	13	17	11	
I. Shadow	Ingress	6	15	16		I. Transit	Egress	13	18	8	
I. Transit	Egress	6	16	10		I. Shadow	Egress	13	19	25	
I. Shadow	Egress	6	17	30		II. Occult.	Disapp.	13	21	24	
II. Occult.	Disapp.	6	18	42		II. Occult.	Reapp.	13	23	58	
II. Occult.	Reapp.	6	21	16		II. Eclipse	Disapp.	14	0	4	48.6
II. Eclipse	Disapp.	6	21	27	52.6	II. Eclipse	Reapp.	14	2	25	14.8
II. Eclipse	Reapp.	6	23	48	33.6	III. Occult.	Disapp. W.	14	9	12	
III. Occult.	Disapp.	7	5	1		III. Occult.	Reapp.	14	12	10	
III. Occult.	Reapp. W.	7	7	59		I. Occult.	Disapp.	14	13	13	
III. Eclipse	Disapp. W.	7	10	40	23.1	III. Eclipse	Disapp.	14	14	43	12.3
I. Occult.	Disapp.	7	11	15		I. Eclipse	Reapp.	14	16	42	57.7
III. Eclipse	Reapp.	7	13	4	20.5	III. Eclipse	Reapp.	14	17	5	59.1
I. Eclipse	Reapp.	7	14	47	7.2	I. Transit	Ingress	15	10	23	
I. Transit	Ingress W.	8	8	25		I. Shadow	Ingress	15	11	40	

\* Phases visible at Washington are denoted by W.

# JUPITER'S SATELLITES, 1869. 459

## WASHINGTON MEAN TIME.

### JANUARY.

			d	h	m	s				d	h	m	s
I.	Transit	Egress	15	12	38		I.	Shadow	Egress	22	15	50	
I.	Shadow	Egress	15	13	54		II.	Transit	Ingress	22	19	16	
II.	Transit	Ingress	15	16	31		II.	Shadow	Ingress	22	21	47	
II.	Transit	Egress	15	19	5		II.	Transit	Egress	22	21	50	
II.	Shadow	Ingress	15	19	9		II.	Shadow	Egress	23	0	13	
II.	Shadow	Egress	15	21	35		I.	Occult.	Disapp. W.	23	9	42	
I.	Occult.	Disapp. W.	16	7	43		I.	Eclipse	Reapp.	23	13	7	42.2
I.	Eclipse	Reapp.	16	11	11	56.7	I.	Transit	Ingress W.	24	6	51	
I.	Transit	Ingress	17	4	52		I.	Shadow	Ingress W.	24	8	5	
I.	Shadow	Ingress W.	17	6	9		I.	Transit	Egress W.	24	9	6	
I.	Transit	Egress W.	17	7	7		I.	Shadow	Egress	24	10	19	
I.	Shadow	Egress W.	17	8	23		II.	Occult.	Disapp.	24	13	28	
II.	Occult.	Disapp.	17	10	45		II.	Eclipse	Reapp.	24	18	20	24.5
II.	Occult.	Reapp.	17	13	19		III.	Transit	Ingress	25	3	41	
II.	Eclipse	Disapp.	17	13	23	15.6	I.	Occult.	Disapp.	25	4	12	
II.	Eclipse	Reapp.	17	15	43	34.4	III.	Transit	Egress W.	25	6	39	
III.	Transit	Ingress	17	23	26		I.	Eclipse	Reapp. W.	25	7	36	35.9
I.	Occult.	Disapp.	18	2	13		III.	Shadow	Ingress W.	25	8	46	
III.	Transit	Egress	18	2	23		III.	Shadow	Egress	25	11	21	
III.	Shadow	Ingress	18	4	44		I.	Transit	Ingress	26	1	21	
I.	Eclipse	Reapp. W.	18	5	40	51.4	I.	Shadow	Ingress	26	2	34	
III.	Shadow	Egress W.	18	7	20		I.	Transit	Egress	26	3	36	
I.	Transit	Ingress	18	23	22		I.	Shadow	Egress	26	4	48	
I.	Shadow	Ingress	19	0	38		II.	Transit	Ingress W.	26	8	39	
I.	Transit	Egress	19	1	37		II.	Shadow	Ingress	26	11	6	
I.	Shadow	Egress	19	2	52		II.	Transit	Egress	26	11	12	
II.	Transit	Ingress W.	19	5	53		II.	Shadow	Egress	26	13	33	
II.	Transit	Egress W.	19	8	28		I.	Occult.	Disapp.	26	22	42	
II.	Shadow	Ingress W.	19	8	28		I.	Eclipse	Reapp.	27	2	5	34.8
II.	Shadow	Egress	19	10	54		I.	Transit	Ingress	27	19	50	
I.	Occult.	Disapp.	19	20	42		I.	Shadow	Ingress	27	21	3	
I.	Eclipse	Reapp.	20	0	9	51.5	I.	Transit	Egress	27	22	5	
I.	Transit	Ingress	20	17	52		I.	Shadow	Egress	27	23	17	
I.	Shadow	Ingress	20	19	7		II.	Occult.	Disapp.	28	2	50	
I.	Transit	Egress	20	20	7		II.	Eclipse	Reapp. W.	28	7	38	57.8
I.	Shadow	Egress	20	21	21		I.	Occult.	Disapp.	28	17	12	
II.	Occult.	Disapp.	21	0	6		III.	Occult.	Disapp.	28	17	44	
II.	Occult.	Reapp.	21	2	40		I.	Eclipse	Reapp.	28	20	34	26.6
II.	Eclipse	Disapp.	21	2	41	51.5	III.	Occult.	Reapp.	28	20	41	
II.	Eclipse	Reapp.	21	5	2	2.9	III.	Eclipse	Disapp.	28	22	48	26.1
III.	Occult.	Disapp.	21	13	26		III.	Eclipse	Reapp.	29	1	8	49.7
I.	Occult.	Disapp.	21	15	12		I.	Transit	Ingress	29	14	20	
III.	Occult.	Reapp.	21	16	24		I.	Shadow	Ingress	29	15	32	
I.	Eclipse	Reapp.	21	18	38	44.2	I.	Transit	Egress	29	16	35	
III.	Eclipse	Disapp.	21	18	45	52.5	I.	Shadow	Egress	29	17	46	
III.	Eclipse	Reapp.	21	21	7	27.1	II.	Transit	Ingress	29	22	1	
I.	Transit	Ingress	22	12	21		II.	Shadow	Ingress	30	0	25	
I.	Shadow	Ingress	22	13	36		II.	Transit	Egress	30	0	35	
I.	Transit	Egress	22	14	36		II.	Shadow	Egress	30	2	51	

# 460 JUPITER'S SATELLITES, 1869.

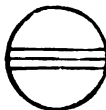
## WASHINGTON MEAN TIME.

### JANUARY.

I. Occult.	Disapp.	d	h	m	s	I. Transit	Egress	d	h	m	s
I. Eclipse	Reapp.	30	11	42		I. Shadow	Egress	31	11	5	
I. Transit	Ingress W.	30	15	3	23.2	II. Occult.	Disapp.	31	16	11	
I. Shadow	Ingress	31	10	1		II. Eclipse	Reapp.	31	20	57	24.0

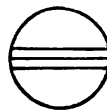
### Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.



r  
\*

III.



d      r  
\*      \*

II.



d      r  
\*      \*

IV.

Not Eclipsed.

### FEBRUARY.

I. Occult.	Disapp. W.	d	h	m	s	III. Occult.	Reapp.	d	h	m	s
III. Transit	Ingress W.	1	6	12		III. Eclipse	Disapp.	5	2	51	3.2
I. Eclipse	Reapp.	1	9	32	15.7	III. Eclipse	Reapp.	5	5	10	16.2
III. Transit	Egress	1	10	58		I. Transit	Ingress	5	16	20	
III. Shadow	Ingress	1	12	49		I. Shadow	Ingress	5	17	27	
III. Shadow	Egress	1	15	23		I. Transit	Egress	5	18	35	
I. Transit	Ingress	2	3	20		I. Shadow	Egress	5	19	41	
I. Shadow	Ingress	2	4	30		II. Transit	Ingress	6	0	49	
I. Transit	Egress W.	2	5	35		II. Shadow	Ingress	6	3	3	
I. Shadow	Egress W.	2	6	44		II. Transit	Egress	6	3	22	
II. Transit	Ingress	2	11	25		II. Shadow	Egress	6	5	29	
II. Shadow	Ingress	2	13	44		I. Occult.	Disapp.	6	13	42	
II. Transit	Egress	2	13	58		I. Eclipse	Reapp.	6	16	58	59.5
II. Shadow	Egress	2	16	10		I. Transit	Ingress	7	10	51	
i. Occult.	Disapp.	3	0	42		I. Shadow	Ingress	7	11	56	
I. Eclipse	Reapp.	3	4	1	13.4	I. Transit	Egress	7	13	6	
I. Transit	Ingress	3	21	50		I. Shadow	Egress	7	14	10	
I. Shadow	Ingress	3	22	58		II. Occult.	Disapp.	7	19	0	
I. Transit	Egress	4	0	5		II. Eclipse	Reapp.	7	23	34	24.5
I. Shadow	Egress	4	1	12		I. Occult.	Disapp. W.	8	8	12	
II. Occult.	Disapp. W.	4	5	36		I. Eclipse	Reapp.	8	11	27	50.7
II. Eclipse	Reapp.	4	10	15	59.5	III. Transit	Ingress	8	12	23	
I. Occult.	Disapp.	4	19	12		III. Transit	Egress	8	15	19	
III. Occult.	Disapp.	4	22	5		III. Shadow	Ingress	8	16	52	
I. Eclipse	Reapp.	4	22	30	4.1	III. Shadow	Egress	8	19	25	

# JUPITER'S SATELLITES, 1869. 461

WASHINGTON MEAN TIME.

FEBRUARY.

		d	h	m	s			d	h	m	s
I. Transit	Ingress	9	5	21		II. Shadow	Ingress	16	19	0	
I. Shadow	Ingress W.	9	6	25		II. Transit	Egress	16	19	34	
I. Transit	Egress W.	9	7	36		II. Shadow	Egress	16	21	25	
I. Shadow	Egress W.	9	8	39		I. Occult.	Disapp.	17	4	43	
II. Transit	Ingress	9	14	12		I. Eclipse	Reapp. W.	17	7	52	14.9
II. Shadow	Ingress	9	16	22		I. Transit	Ingress	18	1	52	
II. Transit	Egress	9	16	45		I. Shadow	Ingress	18	2	50	
II. Shadow	Egress	9	18	48		I. Transit	Egress	18	4	7	
I. Occult.	Disapp.	10	2	42		I. Shadow	Egress	18	5	3	
I. Eclipse	Reapp. W.	10	5	56	47.1	II. Occult.	Disapp.	18	11	12	
I. Transit	Ingress	10	23	51		II. Eclipse	Reapp.	18	15	30	22.6
I. Shadow	Ingress	11	0	54		I. Occult.	Disapp.	18	23	14	
I. Transit	Egress	11	2	6		I. Eclipse	Reapp.	19	2	21	3.5
I. Shadow	Egress	11	3	7		III. Occult.	Disapp. W.	19	6	55	
II. Occult.	Disapp. W	11	8	24		III. Occult.	Reapp.	19	9	48	
II. Eclipse	Reapp.	11	12	53	8.0	III. Eclipse	Disapp.	19	10	56	53.0
I. Occult.	Disapp.	11	21	13		III. Eclipse	Reapp.	19	13	13	46.2
I. Eclipse	Reapp.	12	0	25	36.7	I. Transit	Ingress	19	20	23	
III. Occult.	Disapp.	12	2	29		I. Shadow	Ingress	19	21	19	
III. Occult.	Reapp.	12	5	24		I. Transit	Egress	19	22	38	
III. Eclipse	Disapp. W.	12	6	54	11.4	I. Shadow	Egress	19	23	32	
III. Eclipse	Reapp.	12	9	12	14.2	II. Transit	Ingress W.	20	6	26	
I. Transit	Ingress	12	18	22		II. Shadow	Ingress W.	20	8	19	
I. Shadow	Ingress	12	19	23		II. Transit	Egress	20	8	58	
I. Transit	Egress	12	20	37		II. Shadow	Egress	20	10	44	
I. Shadow	Egress	12	21	36		I. Occult.	Disapp.	20	17	44	
II. Transit	Ingress	13	3	37		I. Eclipse	Reapp.	20	20	49	55.3
II. Shadow	Ingress	13	5	41		I. Transit	Ingress	21	14	53	
II. Transit	Egress W.	13	6	9		I. Shadow	Ingress	21	15	48	
II. Shadow	Egress W.	13	8	6		I. Transit	Egress	21	17	8	
I. Occult.	Disapp.	13	15	43		I. Shadow	Egress	21	18	1	
I. Eclipse	Reapp.	13	18	54	30.3	II. Occult.	Disapp.	22	0	37	
I. Transit	Ingress	14	12	52		II. Eclipse	Reapp.	22	4	48	49.8
I. Shadow	Ingress	14	13	52		I. Occult.	Disapp.	22	12	14	
I. Transit	Egress	14	15	7		I. Eclipse	Reapp.	22	15	18	43.9
I. Shadow	Egress	14	16	5		III. Transit	Ingress	22	21	14	
II. Occult.	Disapp.	14	21	48		III. Transit	Egress	23	0	6	
II. Eclipse	Reapp.	15	2	11	34.1	III. Shadow	Ingress	23	0	56	
I. Occult.	Disapp.	15	10	13		III. Shadow	Egress	23	3	27	
I. Eclipse	Reapp.	15	13	23	20.3	I. Transit	Ingress	23	9	23	
III. Transit	Ingress	15	16	47		I. Shadow	Ingress	23	10	17	
III. Transit	Egress	15	19	42		I. Transit	Egress	23	11	38	
III. Shadow	Ingress	15	20	54		I. Shadow	Egress	23	12	30	
III. Shadow	Egress	15	23	26		II. Transit	Ingress	23	19	51	
I. Transit	Ingress W.	16	7	22		II. Shadow	Ingress	23	21	37	
I. Shadow	Ingress W.	16	8	21		II. Transit	Egress	23	22	22	
I. Transit	Egress	16	9	37		II. Shadow	Egress	24	0	2	
I. Shadow	Egress	16	10	34		I. Occult.	Disapp. W.	24	6	45	
II. Transit	Ingress	16	17	1		I. Eclipse	Reapp.	24	9	47	37.2




# 462 JUPITER'S SATELLITES, 1869.

## WASHINGTON MEAN TIME.

### FEBRUARY.

I. Transit	Ingress	d h m s	25 3 54	I. Shadow	Ingress	d h m s	26 23 14
I. Shadow	Ingress	25 4 45		I. Transit	Egress	27 0 39	
I. Transit	Egress W.	25 6 9		I. Shadow	Egress	27 1 27	
I. Shadow	Egress W.	25 6 58		II. Transit	Ingress	27 9 15	
II. Occult.	Disapp.	25 14 2		II. Shadow	Ingress	27 10 56	
II. Eclipse	Reapp.	25 18 7 43.5		II. Transit	Egress	27 11 47	
I. Occult.	Disapp.	26 1 15		II. Shadow	Egress	27 13 21	
I. Eclipse	Reapp.	26 4 16 24.4		I. Occult.	Disapp.	27 19 45	
III. Occult.	Disapp.	26 11 23		I. Eclipse	Reapp.	27 22 45 14.7	
III. Occult.	Reapp.	26 14 15		I. Transit	Ingress	28 16 55	
III. Eclipse	Disapp.	26 14 59 50.8		I. Shadow	Ingress	28 17 43	
III. Eclipse	Reapp.	26 17 15 34.8		I. Transit	Egress	28 19 9	
I. Transit	Ingress	26 22 24		I. Shadow	Egress	28 19 56	

### Phases of the Eclipses of the Satellites for an Inverting Telescope.

I. 	III. 
II. 	IV. Not Eclipsed.

### MARCH.

II. Occult.	Disapp.	d h m s	1 3 27	I. Occult.	Disapp.	d h m s	3 8 46
II. Eclipse	Reapp. W.	1 7 26 11.4		I. Eclipse	Reapp.	3 11 42 53.0	
I. Occult.	Disapp.	1 14 16		I. Transit	Ingress	4 5 55	
I. Eclipse	Reapp.	1 17 14 1.5		I. Shadow	Ingress W.	4 6 41	
III. Transit	Ingress	2 1 42		I. Transit	Egress	4 8 10	
III. Transit	Egress	2 4 33		I. Shadow	Egress	4 8 54	
III. Shadow	Ingress	2 4 59		II. Occult.	Disapp.	4 16 53	
III. Shadow	Egress W.	2 7 28		II. Eclipse	Reapp.	4 20 45 10.1	
I. Transit	Ingress	2 11 25		I. Occult.	Disapp.	5 3 17	
I. Shadow	Ingress	2 12 12		I. Eclipse	Reapp. W.	5 6 11 38.6	
I. Transit	Egress	2 13 40		III. Occult.	Disapp.	5 15 52	
I. Shadow	Egress	2 14 25		III. Occult.	Reapp.	5 18 42	
II. Transit	Ingress	2 22 40		III. Eclipse	Disapp.	5 19 2 6.0	
II. Shadow	Ingress	3 0 15		III. Eclipse	Reapp.	5 21 16 41.6	
II. Transit	Egress	3 1 12		I. Transit	Ingress	6 0 26	
II. Shadow	Egress	3 2 39		I. Shadow	Ingress	6 1 10	



# JUPITER'S SATELLITES, 1869. 463

WASHINGTON MEAN TIME.

## MARCH.

		d	h	m	s			d	h	m	s
I. Transit	Egress	6	2	41		I. Shadow	Egress	11	10	49	
I. Shadow	Egress	6	3	23		II. Occult.	Disapp.	11	19	44	
II. Transit	Ingress	6	12	6		II. Eclipse	Reapp.	11	23	22	41.7
II. Shadow	Ingress	6	13	33		I. Occult.	Disapp.	12	5	19	
II. Transit	Egress	6	14	37		I. Eclipse	Reapp.	12	8	6	46.4
II. Shadow	Egress	6	15	58		III. Occult.	Disapp.	12	20	22	
I. Occult.	Disapp.	6	21	47		III. Eclipse	Reapp.	13	1	17	34.8
I. Eclipse	Reapp.	7	0	40	27.2	I. Transit	Ingress	13	2	28	
I. Transit	Ingress	7	18	56		I. Shadow	Ingress	13	3	5	
I. Shadow	Ingress	7	19	38		I. Transit	Egress	13	4	43	
I. Transit	Egress	7	21	11		I. Shadow	Egress	13	5	18	
I. Shadow	Egress	7	21	51		II. Transit	Ingress	13	14	56	
II. Occult.	Disapp. W.	8	6	18		II. Shadow	Ingress	13	16	10	
II. Eclipse	Reapp.	8	10	3	38.5	II. Transit	Egress	13	17	27	
I. Occult.	Disapp.	8	16	18		II. Shadow	Egress	13	18	35	
I. Eclipse	Reapp.	8	19	9	12.4	I. Occult.	Disapp.	13	23	49	
III. Transit	Ingress	9	6	13		I. Eclipse	Reapp.	14	2	35	33.1
III. Transit	Egress	9	9	2		I. Transit	Ingress	14	20	59	
III. Shadow	Ingress	9	9	2		I. Shadow	Ingress	14	21	34	
III. Shadow	Egress	9	11	30		I. Transit	Egress	14	23	14	
I. Transit	Ingress	9	13	27		I. Shadow	Egress	14	23	47	
I. Shadow	Ingress	9	14	7		II. Occult.	Disapp.	15	9	10	
I. Transit	Egress	9	15	42		II. Eclipse	Reapp.	15	12	41	10.1
I. Shadow	Egress	9	16	20		I. Occult.	Disapp.	15	18	20	
II. Transit	Ingress	10	1	31		I. Eclipse	Reapp.	15	21	4	16.6
II. Shadow	Ingress	10	2	52		III. Transit	Ingress	16	10	44	
II. Transit	Egress	10	4	2		III. Shadow	Ingress	16	13	4	
II. Shadow	Egress	10	5	16		III. Transit	Egress	16	13	31	
I. Occult.	Disapp.	10	10	48		I. Transit	Ingress	16	15	29	
I. Eclipse	Reapp.	10	13	38	2.3	III. Shadow	Egress	16	15	31	
I. Transit	Ingress	11	7	57		I. Shadow	Ingress	16	16	3	
I. Shadow	Ingress	11	8	36		I. Transit	Egress	16	17	44	
I. Transit	Egress	11	10	12		I. Shadow	Egress	16	18	16	

Phases of the Eclipses of the Satellites for an Inverting Telescope.

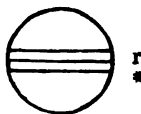
I.



III.



II.



IV.

Not Eclipsed.

The Satellites are not visible from March 16th to May 18th, Jupiter being too near the Sun.

# 464 JUPITER'S SATELLITES, 1869.

## WASHINGTON MEAN TIME.

### MAY.

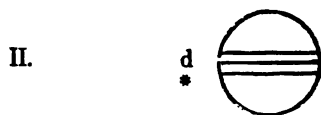
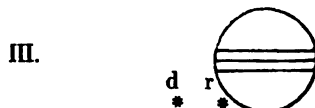
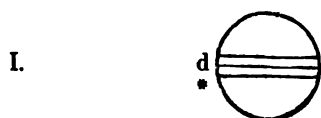
		d	h	m	s			d	h	m	s
II.	Eclipse	Disapp	18	10	4	14.9	II.	Eclipse	Disapp.	25	12 42 11.7
I.	Eclipse	Disapp	18	12	7	48.6	I.	Eclipse	Disapp.	25	14 1 56.8
II.	Occult.	Reapp.	18	13	32		II.	Occult.	Reapp.	25	16 24
I.	Occult.	Reapp.	18	14	51		I.	Occult.	Reapp.	25	16 52
I.	Shadow	Ingress	19	9	18		I.	Shadow	Ingress	26	11 13
I.	Transit	Ingress	19	9	51		I.	Transit	Ingress	26	11 53
I.	Shadow	Egress	19	11	31		I.	Shadow	Egress	26	13 26
I.	Transit	Egress	19	12	5		I.	Transit	Egress	26	14 6
III.	Shadow	Ingress	20	1	22		III.	Shadow	Ingress	27	5 23
III.	Transit	Ingress	20	3	39		II.	Shadow	Ingress	27	7 25
III.	Shadow	Egress	20	3	40		III.	Shadow	Egress	27	7 40
II.	Shadow	Ingress	20	4	50		III.	Transit	Ingress	27	8 9
II.	Transit	Ingress	20	6	0		I.	Eclipse	Disapp.	27	8 30 29.0
III.	Transit	Egress	20	6	2		II.	Transit	Ingress	27	8 49
I.	Eclipse	Disapp.	20	6	36	22.3	II.	Shadow	Egress	27	9 47
II.	Shadow	Egress	20	7	12		III.	Transit	Egress	27	10 29
II.	Transit	Egress	20	8	24		II.	Transit	Egress	27	11 12
I.	Occult.	Reapp.	20	9	22		I.	Occult.	Reapp.	27	11 22
I.	Shadow	Ingress	21	3	46		I.	Shadow	Ingress	28	5 42
I.	Transit	Ingress	21	4	22		I.	Transit	Ingress	28	6 23
I.	Shadow	Egress	21	5	59		I.	Shadow	Egress	28	7 54
I.	Transit	Egress	21	6	35		I.	Transit	Egress	28	8 36
II.	Eclipse	Disapp.	21	23	23	46.9	II.	Eclipse	Disapp.	29	2 1 42.5
I.	Eclipse	Disapp.	22	1	4	55.0	I.	Eclipse	Disapp.	29	2 59 0.5
II.	Occult.	Reapp.	22	2	58		II.	Occult.	Reapp.	29	5 50
I.	Occult.	Reapp.	22	3	52		I.	Occult.	Reapp.	29	5 52
I.	Shadow	Ingress	22	22	15		I.	Shadow	Ingress	30	0 11
I.	Transit	Ingress	22	22	52		I.	Transit	Ingress	30	0 53
I.	Shadow	Egress	23	0	28		I.	Shadow	Egress	30	2 23
I.	Transit	Egress	23	1	5		I.	Transit	Egress	30	3 6
III.	Eclipse	Disapp.	23	15	21	20.2	III.	Eclipse	Disapp.	30	19 22 33.4
III.	Eclipse	Reapp.	23	17	24	17.2	II.	Shadow	Ingress	30	20 42
III.	Occult.	Disapp.	23	17	46		III.	Eclipse	Reapp.	30	21 24 33.0
II.	Shadow	Ingress	23	18	8		I.	Eclipse	Disapp.	30	21 27 30.6
II.	Transit	Ingress	23	19	24		II.	Transit	Ingress	30	22 13
I.	Eclipse	Disapp.	23	19	33	26.1	III.	Occult.	Disapp.	30	22 15
III.	Occult.	Reapp.	23	20	8		II.	Shadow	Egress	30	23 4
II.	Shadow	Egress	23	20	30		I.	Occult.	Reapp.	31	0 22
II.	Transit	Egress	23	21	48		III.	Occult.	Reapp.	31	0 34
I.	Occult.	Reapp.	23	22	22		II.	Transit	Egress	31	0 36
I.	Shadow	Ingress	24	16	44		I.	Shadow	Ingress	31	18 39
I.	Transit	Ingress	24	17	22		I.	Transit	Ingress	31	19 23
I.	Shadow	Egress	24	18	57		I.	Shadow	Egress	31	20 51
I.	Transit	Egress	24	19	35		I.	Transit	Egress	31	21 36

# JUPITER'S SATELLITES, 1869. 465

WASHINGTON MEAN TIME.

MAY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



IV. Not Eclipsed.

JUNE.

II. Eclipse	Disapp.	d	h	m	s		I. Eclipse	Disapp.	d	h	m	s
I. Eclipse	Disapp. W	1	15	20	5.4		III. Eclipse	Disapp.	6	23	21	30.5
I. Occult.	Reapp.	1	15	56	0.1		II. Transit	Ingress	6	23	23	50.6
II. Occult.	Reapp.	1	18	52			III. Eclipse	Reapp.	7	1	1	
I. Shadow	Ingress	1	19	14			II. Shadow	Egress	7	1	25	3.0
I. Transit	Ingress	2	13	8			I. Occult.	Reapp.	7	1	39	
I. Shadow	Egress	2	13	53			III. Occult.	Disapp.	7	2	22	
I. Transit	Egress	2	15	20			II. Transit	Egress	7	2	43	
III. Shadow	Ingress	2	16	6			III. Occult.	Reapp.	7	3	24	
II. Shadow	Ingress	3	9	24			I. Shadow	Ingress	7	4	59	
I. Eclipse	Disapp.	3	10	0			I. Transit	Ingress	7	20	33	
II. Transit	Ingress	3	10	24	31.1		I. Shadow	Egress	7	21	24	
III. Shadow	Egress	3	11	37			I. Transit	Egress	7	22	46	
II. Shadow	Egress	3	11	41			I. Eclipse	Disapp.	7	23	37	
III. Transit	Ingress	3	12	22			II. Eclipse	Disapp.	8	17	49	59.1
I. Occult.	Reapp.	3	12	37			I. Occult.	Reapp.	8	17	57	54.4
II. Transit	Egress	3	13	22			II. Occult.	Reapp.	8	20	52	
III. Transit	Egress	3	14	0			I. Shadow	Ingress	8	22	4	
I. Shadow	Ingress	3	14	55			I. Transit	Ingress	9	15	2	
I. Transit	Ingress	4	7	36			I. Shadow	Egress	9	15	54	
I. Shadow	Egress	4	8	23			I. Transit	Egress	9	17	15	
I. Transit	Egress	4	9	48			I. Eclipse	Disapp.	9	18	7	
II. Eclipse	Disapp.	4	10	36			II. Shadow	Ingress	10	12	18	28.6
I. Eclipse	Disapp.	5	4	39	33.8		III. Shadow	Ingress	10	12	34	
I. Occult.	Reapp.	5	4	53	1.6		II. Transit	Ingress	10	13	25	
II. Occult.	Reapp.	5	7	52			II. Shadow	Egress	10	14	25	
I. Shadow	Ingress	5	8	40			I. Occult.	Reapp. W.	10	14	56	
I. Transit	Ingress	6	2	5			III. Shadow	Egress W.	10	15	22	
I. Shadow	Egress	6	2	54			II. Transit	Egress	10	15	41	
I. Transit	Egress	6	4	17			III. Transit	Ingress	10	16	46	
II. Shadow	Ingress	6	5	7			III. Transit	Egress	10	17	5	
		6	23	17					10	19	19	

# 466 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

JUNE.

		d	h	m	s			d	h	m	s
I.	Shadow	Ingress	11	9	30		II.	Eclipse	Disapp.	19	9 55 1.4
I.	Transit	Ingress	11	10	25		I.	Occult.	Reapp.	19	11 51
I.	Shadow	Egress	11	11	43		II.	Occult.	Reapp.	19	14 19
I.	Transit	Egress	11	12	38		I.	Shadow	Ingress	20	5 53
I.	Eclipse	Disapp.	12	6	46 58.4		I.	Transit	Ingress	20	6 56
II.	Eclipse	Disapp.	12	7	17 20.5		I.	Shadow	Egress	20	8 7
I.	Occult.	Reapp.	12	9	52		I.	Transit	Egress	20	9 8
II.	Occult.	Reapp.	12	11	30		I.	Eclipse	Disapp.	21	3 9 17.8
I.	Shadow	Ingress	13	3	59		II.	Shadow	Ingress	21	4 26
I.	Transit	Ingress	13	4	55		I.	Occult.	Reapp.	21	6 21
I.	Shadow	Egress	13	6	12		II.	Transit	Ingress	21	6 34
I.	Transit	Egress	13	7	8		II.	Shadow	Egress	21	6 48
I.	Eclipse	Disapp.	14	1	15 26.0		III.	Eclipse	Disapp.	21	7 25 20.4
II.	Shadow	Ingress	14	1	52		II.	Transit	Egress	21	8 55
III.	Eclipse	Disapp.	14	3	24 45.9		III.	Eclipse	Reapp.	21	9 24 35.6
II.	Transit	Ingress	14	3	48		III.	Occult.	Disapp.	21	11 34
II.	Shadow	Egress	14	4	13		III.	Occult.	Reapp.	21	13 43
I.	Occult.	Reapp.	14	4	22		I.	Shadow	Ingress	22	0 22
III.	Eclipse	Reapp.	14	5	24 54.5		I.	Transit	Ingress	22	1 26
II.	Transit	Egress	14	6	10		I.	Shadow	Egress	22	2 35
III.	Occult.	Disapp.	14	7	9		I.	Transit	Egress	22	3 38
III.	Occult.	Reapp.	14	9	22		I.	Eclipse	Disapp.	22	21 37 45.1
I.	Shadow	Ingress	14	22	28		II.	Eclipse	Disapp.	22	23 13 16.5
I.	Transit	Ingress	14	23	25		I.	Occult.	Reapp.	23	0 51
I.	Shadow	Egress	15	0	40		II.	Occult.	Reapp.	23	3 42
I.	Transit	Egress	15	1	38		I.	Shadow	Ingress	23	18 51
I.	Eclipse	Disapp.	15	19	43 53.9		I.	Transit	Ingress	23	19 56
II.	Eclipse	Disapp.	15	20	35 38.5		I.	Shadow	Egress	23	21 4
I.	Occult.	Reapp.	15	22	52		I.	Transit	Egress	23	22 8
II.	Occult.	Reapp.	16	0	54		I.	Eclipse	Disapp.	24	16 6 12.3
I.	Shadow	Ingress	16	16	56		II.	Shadow	Ingress	24	17 43
I.	Transit	Ingress	16	17	56		I.	Occult.	Reapp.	24	19 21
I.	Shadow	Egress	16	19	9		II.	Transit	Ingress	24	19 56
I.	Transit	Egress	16	20	8		II.	Shadow	Egress	24	20 5
I.	Eclipse	Disapp.	17	14	12 22.2		III.	Shadow	Ingress	24	21 28
II.	Shadow	Ingress W.	17	15	9		II.	Transit	Egress	24	22 17
II.	Transit	Ingress	17	17	11		III.	Shadow	Egress	24	23 42
I.	Occult.	Reapp.	17	17	21		III.	Transit	Ingress	25	1 55
III.	Shadow	Ingress	17	17	27		III.	Transit	Egress	25	4 3
II.	Shadow	Egress	17	17	31		I.	Shadow	Ingress	25	13 19
II.	Transit	Egress	17	19	32		I.	Transit	Ingress W.	25	14 26
III.	Shadow	Egress	17	19	42		I.	Shadow	Egress W.	25	15 32
III.	Transit	Ingress	17	21	31		I.	Transit	Egress	25	16 38
III.	Transit	Egress	17	23	42		I.	Eclipse	Disapp.	26	10 34 40.9
I.	Shadow	Ingress	18	11	25		II.	Eclipse	Disapp.	26	12 32 36.4
I.	Transit	Ingress	18	12	26		I.	Occult.	Reapp.	26	13 50
I.	Shadow	Egress	18	13	38		II.	Occult.	Reapp.	26	17 6
I.	Transit	Egress	18	14	38		I.	Shadow	Ingress	27	7 48
I.	Eclipse	Disapp.	19	8	40 51.4		I.	Transit	Ingress	27	8 55



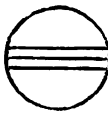
# JUPITER'S SATELLITES, 1869. 467

## WASHINGTON MEAN TIME.

### JUNE.

		d	h	m	s			d	h	m	s
I.	Shadow	Egress	27	10	1	I.	Transit	Ingress	29	3	25
I.	Transit	Egress	27	11	7	I.	Shadow	Egress	29	4	29
I.	Eclipse	Disapp.	28	5	3 6.6	I.	Transit	Egress	29	5	37
II.	Shadow	Ingress	28	7	1	I.	Eclipse	Disapp.	29	23	31 33.2
I.	Occult.	Reapp.	28	8	20	II.	Eclipse	Disapp.	30	1	50 48.9
II.	Transit	Ingress	28	9	19	I.	Occult.	Reapp.	30	2	49
II.	Shadow	Egress	28	9	22	II.	Eclipse	Reapp.	30	4	6 53.1
III.	Eclipse	Disapp.	28	11	25 56.1	II.	Occult.	Disapp.	30	4	9
II.	Transit	Egress	28	11	40	II.	Occult.	Reapp.	30	6	29
III.	Eclipse	Reapp.	28	13	24 19.3	I.	Shadow	Ingress	30	20	45
III.	Occult.	Disapp.	28	15	56	I.	Transit	Ingress	30	21	55
III.	Occult.	Reapp.	28	18	2	I.	Shadow	Egress	30	22	58
I.	Shadow	Ingress	29	2	16						

### Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.	d		III.	d	r	
II.	d		IV.	Not Eclipsed.		

### JULY.

		d	h	m	s			d	h	m	s
I.	Transit	Egress	1	0	7	II.	Eclipse	Disapp. W.	3	15	10 4.0
I.	Eclipse	Disapp.	1	17	59 59.7	I.	Occult.	Reapp. W.	3	15	48
II.	Shadow	Ingress	1	20	18	II.	Eclipse	Reapp.	3	17	26 4.8
I.	Occult.	Reapp.	1	21	19	II.	Occult.	Disapp.	3	17	33
II.	Shadow	Egress	1	22	39	II.	Occult.	Reapp.	3	19	53
II.	Transit	Ingress	1	22	41	I.	Shadow	Ingress	4	9	43
II.	Transit	Egress	2	1	1	I.	Transit	Ingress	4	10	54
III.	Shadow	Ingress	2	1	30	I.	Shadow	Egress	4	11	55
III.	Shadow	Egress	2	3	43	I.	Transit	Egress	4	13	6
III.	Transit	Ingress	2	6	17	I.	Eclipse	Disapp.	5	6	56 53.0
III.	Transit	Egress	2	8	21	II.	Shadow	Ingress	5	9	35
I.	Shadow	Ingress W.	2	15	14	I.	Occult.	Reapp.	5	10	18
I.	Transit	Ingress	2	16	24	II.	Shadow	Egress	5	11	57
I.	Shadow	Egress	2	17	26	II.	Transit	Ingress	5	12	3
I.	Transit	Egress	2	18	36	II.	Transit	Egress W.	5	14	23
I.	Eclipse	Disapp.	3	12	28 27.8	III.	Eclipse	Disapp. W.	5	15	26 35.2

# 468 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

JULY.

		d	h	m	s			d	h	m	s
III. Eclipse	Reapp.	5	17	24	8.0	III. Occult.	Disapp.	13	0	33	
III. Occult.	Disapp.	5	20	16		III. Occult.	Reapp.	13	2	34	
III. Occult.	Reapp.	5	22	19		I. Shadow	Ingress	13	6	6	
I. Shadow	Ingress	6	4	11		I. Transit	Ingress	13	7	22	
I. Transit	Ingress	6	5	24		I. Shadow	Egress	13	8	18	
I. Shadow	Egress	6	6	23		I. Transit	Egress	13	9	34	
I. Transit	Egress	6	7	36		I. Eclipse	Disapp.	14	3	19	2.6
I. Eclipse	Disapp.	7	1	25	19.0	I. Occult.	Reapp.	14	6	45	
II. Eclipse	Disapp.	7	4	28	13.8	II. Eclipse	Disapp.	14	7	5	31.4
I. Occult.	Reapp.	7	4	47		II. Eclipse	Reapp.	14	9	21	22.6
II. Eclipse	Reapp.	7	6	44	11.2	II. Occult.	Disapp.	14	9	40	
II. Occult.	Disapp.	7	6	55		II. Occult.	Reapp.	14	11	59	
II. Occult.	Reapp.	7	9	15		I. Shadow	Ingress	15	0	35	
I. Shadow	Ingress	7	22	40		I. Transit	Ingress	15	1	51	
I. Transit	Ingress	7	23	53		I. Shadow	Egress	15	2	47	
I. Shadow	Egress	8	0	52		I. Transit	Egress	15	4	3	
I. Transit	Egress	8	2	5		I. Eclipse	Disapp.	15	21	47	27.6
I. Eclipse	Disapp.	8	19	53	44.8	I. Occult.	Reapp.	16	1	15	
II. Shadow	Ingress	8	22	53		II. Shadow	Ingress	16	1	27	
I. Occult.	Reapp.	8	23	17		II. Shadow	Egress	16	3	48	
II. Shadow	Egress	9	1	14		II. Transit	Ingress	16	4	6	
II. Transit	Ingress	9	1	24		II. Transit	Egress	16	6	25	
II. Transit	Egress	9	3	44		III. Shadow	Ingress	16	9	31	
III. Shadow	Ingress	9	5	31		III. Shadow	Egress	16	11	43	
III. Shadow	Egress	9	7	43		III. Transit	Ingress W.	16	14	51	
III. Transit	Ingress	9	10	35		III. Transit	Egress	16	16	50	
III. Transit	Egress	9	12	37		I. Shadow	Ingress	16	19	3	
I. Shadow	Ingress	9	17	9		I. Transit	Ingress	16	20	21	
I. Transit	Ingress	9	18	23		I. Shadow	Egress	16	21	15	
I. Shadow	Egress	9	19	21		I. Transit	Egress	16	22	33	
I. Transit	Egress	9	20	35		I. Eclipse	Disapp.	17	16	15	56.3
I. Eclipse	Disapp. W.	10	14	22	12.4	I. Occult.	Reapp.	17	19	44	
I. Occult.	Reapp.	10	17	46		II. Eclipse	Disapp.	17	20	24	36.7
II. Eclipse	Disapp.	10	17	47	24.7	II. Eclipse	Reapp.	17	22	40	24.9
II. Eclipse	Reapp.	10	20	3	18.9	II. Occult.	Disapp.	17	23	2	
II. Occult.	Disapp.	10	20	18		II. Occult.	Reapp.	18	1	21	
II. Occult.	Reapp.	10	22	38		I. Shadow	Ingress W.	18	13	32	
I. Shadow	Ingress	11	11	37		I. Transit	Ingress W.	18	14	50	
I. Transit	Ingress	11	12	52		I. Shadow	Egress W.	18	15	44	
I. Shadow	Egress W.	11	13	50		I. Transit	Egress	18	17	2	
I. Transit	Egress W.	11	15	4		I. Eclipse	Disapp	19	10	44	19.5
I. Eclipse	Disapp.	12	8	50	37.1	I. Occult.	Reapp. W.	19	14	13	
II. Shadow	Ingress	12	12	10		II. Shadow	Ingress W.	19	14	45	
I. Occult.	Reapp.	12	12	16		II. Shadow	Egress	19	17	6	
II. Shadow	Egress W.	12	14	31		II. Transit	Ingress	19	17	26	
II. Transit	Ingress W.	12	14	45		II. Transit	Egress	19	19	45	
II. Transit	Egress	12	17	4		III. Eclipse	Disapp.	19	23	28	34.3
III. Eclipse	Disapp.	12	19	27	49.2	III. Eclipse	Reapp.	20	1	24	31.1
III. Eclipse	Reapp.	12	21	24	33.2	III. Occult.	Disapp.	20	4	48	

# JUPITER'S SATELLITES, 1869. 469

## WASHINGTON MEAN TIME.

### JULY.

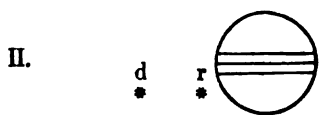
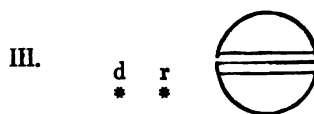
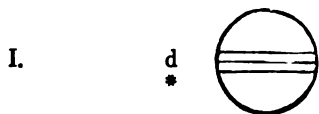
			d	h	m	s				d	h	m	s
III.	Occult.	Reapp.	20	6	45		I.	Occult.	Reapp.	26	16	9	
I.	Shadow	Ingress	20	8	1		II.	Shadow	Ingress	26	17	19	
I.	Transit	Ingress	20	9	20		II.	Shadow	Egress	26	19	40	
I.	Shadow	Egress	20	10	12		II.	Transit	Ingress	26	20	6	
I.	Transit	Egress	20	11	31		II.	Transit	Egress	26	22	24	
I.	Eclipse	Disapp.	21	5	12	45.1	III.	Eclipse	Disapp.	27	3	29	33.6
I.	Occult.	Reapp.	21	8	42		III.	Eclipse	Reapp.	27	5	24	44.8
II.	Eclipse	Disapp.	21	9	42	40.6	III.	Occult.	Disapp.	27	9	0	
II.	Eclipse	Reapp.	21	11	58	25.8	I.	Shadow	Ingress	27	9	54	
II.	Occult.	Disapp.	21	12	23		III.	Occult.	Reapp.	27	10	54	
II.	Occult.	Reapp. W.	21	14	42		I.	Transit	Ingress	27	11	16	
I.	Shadow	Ingress	22	2	29		I.	Shadow	Egress	27	12	6	
I.	Transit	Ingress	22	3	49		I.	Transit	Egress W.	27	13	27	
I.	Shadow	Egress	22	4	41		I.	Eclipse	Disapp.	28	7	6	26.9
I.	Transit	Egress	22	6	0		I.	Occult.	Reapp.	28	10	38	
I.	Eclipse	Disapp.	22	23	41	9.7	II.	Eclipse	Disapp.	28	12	19	41.3
I.	Occult.	Reapp.	23	3	11		II.	Eclipse	Reapp. W.	28	14	35	20.9
II.	Shadow	Ingress	23	4	2		II.	Occult.	Disapp. W.	28	15	4	
II.	Shadow	Egress	23	6	23		II.	Occult.	Reapp.	28	17	23	
II.	Transit	Ingress	23	6	46		I.	Shadow	Ingress	29	4	23	
II.	Transit	Egress	23	9	5		I.	Transit	Ingress	29	5	45	
III.	Shadow	Ingress W.	23	13	32		I.	Shadow	Egress	29	6	35	
III.	Shadow	Egress W.	23	15	43		I.	Transit	Egress	29	7	56	
III.	Transit	Ingress	23	19	4		I.	Eclipse	Disapp.	30	1	34	51.2
I.	Shadow	Ingress	23	20	57		I.	Occult.	Reapp.	30	5	7	
III.	Transit	Egress	23	20	59		II.	Shadow	Ingress	30	6	36	
I.	Transit	Ingress	23	22	18		II.	Shadow	Egress	30	8	57	
I.	Shadow	Egress	23	23	9		II.	Transit	Ingress	30	9	25	
I.	Transit	Egress	24	0	29		II.	Transit	Egress	30	11	43	
I.	Eclipse	Disapp.	24	18	9	37.3	III.	Shadow	Ingress	30	17	32	
I.	Occult.	Reapp.	24	21	40		III.	Shadow	Egress	30	19	43	
II.	Eclipse	Disapp.	24	23	1	40.4	I.	Shadow	Ingress	30	22	51	
II.	Eclipse	Reapp.	25	1	17	22.8	III.	Transit	Ingress	30	23	14	
II.	Occult.	Disapp.	25	1	44		I.	Transit	Ingress	31	0	14	
II.	Occult.	Reapp.	25	4	3		I.	Shadow	Egress	31	1	3	
I.	Shadow	Ingress W.	25	15	26		III.	Transit	Egress	31	1	6	
I.	Transit	Ingress	25	16	47		I.	Transit	Egress	31	2	25	
I.	Shadow	Egress	25	17	38		I.	Eclipse	Disapp.	31	20	3	19.1
I.	Transit	Egress	25	18	58		I.	Occult.	Reapp.	31	23	36	
I.	Eclipse	Disapp. W.	26	12	38	1.3							

# 470 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

JULY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



IV.      Not Eclipsed.

AUGUST.

			d	h	m	s				d	h	m	s
II.	Eclipse	Disapp.	1	1	38	35.0	I.	Transit	Egress	5	9	52	
II.	Eclipse	Reapp.	1	3	54	12.0	I.	Eclipse	Disapp.	6	3	28	32.8
II.	Occult.	Disapp.	1	4	25		I.	Occult.	Reapp.	6	7	1	
II.	Occult.	Reapp.	1	6	43		II.	Shadow	Ingress	6	9	11	
I.	Shadow	Ingress	1	17	19		II.	Shadow	Egress	6	11	32	
I.	Transit	Ingress	1	18	43		II.	Transit	Ingress W.	6	12	1	
I.	Shadow	Egress	1	19	32		II.	Transit	Egress W.	6	14	19	
I.	Transit	Egress	1	20	54		III.	Shadow	Ingress	6	21	34	
I.	Eclipse	Disapp. W	2	14	31	42.9	III.	Shadow	Egress	6	23	43	
I.	Occult.	Reapp.	2	18	4		I.	Shadow	Ingress	7	0	44	
II.	Shadow	Ingress	2	19	54		I.	Transit	Ingress	7	2	9	
II.	Shadow	Egress	2	22	15		I.	Shadow	Egress	7	2	57	
II.	Transit	Ingress	2	22	43		III.	Transit	Ingress	7	3	20	
II.	Transit	Egress	3	1	1		I.	Transit	Egress	7	4	20	
III.	Eclipse	Disapp.	3	7	29	57.3	III.	Transit	Egress	7	5	9	
III.	Eclipse	Reapp.	3	9	24	24.5	I.	Eclipse	Disapp.	7	21	57	1.0
I.	Shadow	Ingress	3	11	47		I.	Occult.	Reapp.	8	1	30	
III.	Occult.	Disapp. W.	3	13	7		II.	Eclipse	Disapp.	8	4	15	20.9
I.	Transit	Ingress W.	3	13	11		II.	Eclipse	Reapp.	8	6	30	53.1
I.	Shadow	Egress W.	3	14	0		II.	Occult.	Disapp.	8	7	3	
III.	Occult.	Reapp. W.	3	14	58		II.	Occult.	Reapp.	8	9	21	
I.	Transit	Egress W.	3	15	23		I.	Shadow	Ingress	8	19	13	
I.	Eclipse	Disapp.	4	9	0	8.7	I.	Transit	Ingress	8	20	38	
I.	Occult.	Reapp. W.	4	12	33		I.	Shadow	Egress	8	21	26	
II.	Eclipse	Disapp. W.	4	14	56	33.1	I.	Transit	Egress	8	22	49	
II.	Eclipse	Reapp.	4	17	12	7.7	I.	Eclipse	Disapp.	9	16	25	24.8
II.	Occult.	Disapp.	4	17	44		I.	Occult.	Reapp.	9	19	58	
II.	Occult.	Reapp.	4	20	2		II.	Shadow	Ingress	9	22	29	
I.	Shadow	Ingress	5	6	15		II.	Shadow	Egress	10	0	50	
I.	Transit	Ingress	5	7	40		II.	Transit	Ingress	10	1	19	
I.	Shadow	Egress	5	8	29		II.	Transit	Egress	10	3	37	



# JUPITER'S SATELLITES, 1869. 471

## WASHINGTON MEAN TIME.

### AUGUST.

		d	h	m	s			d	h	m	s
III. Eclipse	Disapp.	10	11	30	13.1	I. Shadow	Ingress W.	17	15	36	
III. Eclipse	Reapp. W.	10	13	23	58.3	I. Transit	Ingress	17	17	0	
I. Shadow	Ingress W.	10	13	41		III. Eclipse	Reapp.	17	17	23	40.9
I. Transit	Ingress W.	10	15	6		I. Shadow	Egress	17	17	49	
I. Shadow	Egress W.	10	15	54		I. Transit	Egress	17	19	11	
III. Occult.	Disapp.	10	17	10		III. Occult.	Disapp.	17	21	10	
I. Transit	Egress	10	17	17		III. Occult.	Reapp.	17	22	54	
III. Occult.	Reapp.	10	18	58		I. Eclipse	Disapp. W.	18	12	47	35.1
I. Eclipse	Disapp.	11	10	53	51.0	I. Occult.	Reapp. W.	18	16	20	
I. Occult.	Reapp. W.	11	14	26		II. Eclipse	Disapp.	18	20	9	50.0
II. Eclipse	Disapp.	11	17	33	16.3	II. Eclipse	Reapp.	18	22	25	16.2
II. Eclipse	Reapp.	11	19	48	46.3	II. Occult.	Disapp.	18	22	57	
II. Occult.	Disapp.	11	20	21		II. Occult.	Reapp.	19	1	13	
II. Occult.	Reapp.	11	22	39		I. Shadow	Ingress	19	10	4	
I. Shadow	Ingress	12	8	10		I. Transit	Ingress W.	19	11	28	
I. Transit	Ingress	12	9	35		I. Shadow	Egress W.	19	12	18	
I. Shadow	Egress	12	10	23		I. Transit	Egress W.	19	13	39	
I. Transit	Egress W.	12	11	46		I. Eclipse	Disapp.	20	7	15	59.7
I. Eclipse	Disapp.	13	5	22	15.4	I. Occult.	Reapp.	20	10	48	
I. Occult.	Reapp.	13	8	55		II. Shadow	Ingress W.	20	14	21	
II. Shadow	Ingress W.	13	11	46		II. Shadow	Egress	20	16	42	
II. Shadow	Egress W.	13	14	7		II. Transit	Ingress	20	17	10	
II. Transit	Ingress W.	13	14	37		II. Transit	Egress	20	19	26	
II. Transit	Egress	13	16	54		I. Shadow	Ingress	21	4	33	
III. Shadow	Ingress	14	1	35		III. Shadow	Ingress	21	5	35	
I. Shadow	Ingress	14	2	39		I. Transit	Ingress	21	5	56	
III. Shadow	Egress	14	3	44		I. Shadow	Egress	21	6	46	
I. Transit	Ingress	14	4	3		III. Shadow	Egress	21	7	44	
I. Shadow	Egress	14	4	51		I. Transit	Egress	21	8	7	
I. Transit	Egress	14	6	14		III. Transit	Ingress W.	21	11	20	
III. Transit	Ingress	14	7	22		III. Transit	Egress W.	21	13	3	
III. Transit	Egress	14	9	8		I. Eclipse	Disapp.	22	1	44	28.9
I. Eclipse	Disapp.	14	23	50	43.9	I. Occult.	Reapp.	22	5	16	
I. Occult.	Reapp.	15	3	23		II. Eclipse	Disapp.	22	9	28	24.9
II. Eclipse	Disapp.	15	6	51	57.3	II. Eclipse	Reapp. W.	22	11	43	49.5
II. Eclipse	Reapp.	15	9	7	25.3	II. Occult.	Disapp. W.	22	12	14	
II. Occult.	Disapp.	15	9	40		II. Occult.	Reapp. W.	22	14	30	
II. Occult.	Reapp. W.	15	11	57		I. Shadow	Ingress	22	23	2	
I. Shadow	Ingress	15	21	7		I. Transit	Ingress	23	0	24	
I. Transit	Ingress	15	22	32		I. Shadow	Egress	23	1	15	
I. Shadow	Egress	15	23	20		I. Transit	Egress	23	2	35	
I. Transit	Egress	16	0	43		I. Eclipse	Disapp.	23	20	12	53.8
I. Eclipse	Disapp.	16	18	19	8.3	I. Occult.	Reapp.	23	23	44	
I. Occult.	Reapp.	16	21	51		II. Shadow	Ingress	24	3	38	
II. Shadow	Ingress	17	1	3		II. Shadow	Egress	24	5	59	
II. Shadow	Egress	17	3	24		II. Transit	Ingress	24	6	25	
II. Transit	Ingress	17	3	53		II. Transit	Egress	24	8	42	
II. Transit	Egress	17	6	10		I. Shadow	Ingress	24	17	30	
III. Eclipse	Disapp. W.	17	15	30	35.9	I. Transit	Ingress	24	18	52	

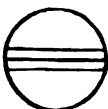
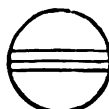
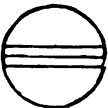
# 472 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

## AUGUST.

III. Eclipse	Disapp.	d <sup>d</sup> h <sup>h</sup> m <sup>m</sup> s <sup>s</sup>	24 19 31 6.1	I. Transit	Egress	d <sup>d</sup> h <sup>h</sup> m <sup>m</sup> s <sup>s</sup>	28 9 59 *
I. Shadow	Egress		24 19 43	III. Shadow	Egress W.		28 11 44
I. Transit	Egress		24 21 3	III. Transit	Ingress W.		28 15 13
III. Eclipse	Reapp.		24 21 23 32.7	III. Transit	Egress		28 16 53
III. Occult.	Disapp.		25 1 5	I. Eclipse	Disapp.		29 3 38 16.2
III. Occult.	Reapp.		25 2 47	I. Occult.	Reapp.		29 7 7
I. Eclipse	Disapp. W.		25 14 41 21.2	II. Eclipse	Disapp. W.		29 12 4 43.5
I. Occult.	Reapp.		25 18 12	II. Eclipse	Reapp. W.		29 14 20 5.1
II. Eclipse	Disapp.		25 22 46 15.2	II. Occult.	Disapp. W.		29 14 45
II. Eclipse	Reapp.		26 1 1 38.2	II. Occult.	Reapp.		29 17 1
II. Occult.	Disapp.		26 1 29	I. Shadow	Ingress		30 0 56
II. Occult.	Reapp.		26 3 46	I. Transit	Ingress		30 2 16
I. Shadow	Ingress W.		26 11 59	I. Shadow	Egress		30 3 9
I. Transit	Ingress W.		26 13 20	I. Transit	Egress		30 4 27
I. Shadow	Egress W.		26 14 12	I. Eclipse	Disapp.		30 22 6 41.7
I. Transit	Egress W.		26 15 31	I. Occult.	Reapp.		31 1 35
I. Eclipse	Disapp.		27 9 9 46.2	II. Shadow	Ingress		31 6 13
I. Occult.	Reapp. W.		27 12 39	II. Shadow	Egress		31 8 34
II. Shadow	Ingress		27 16 56	II. Transit	Ingress		31 8 55
II. Shadow	Egress		27 19 17	II. Transit	Egress W.		31 11 11
II. Transit	Ingress		27 19 40	I. Shadow	Ingress		31 19 25
II. Transit	Egress		27 21 57	I. Transit	Ingress		31 20 44
I. Shadow	Ingress		28 6 27	I. Shadow	Egress		31 21 37
I. Transit	Ingress		28 7 48	I. Transit	Egress		31 22 55
I. Shadow	Egress		28 8 40	III. Eclipse	Disapp.		31 23 32 15.5
III. Shadow	Ingress		28 9 36				

Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.	d *		III.	d *   r *	
II.	d *   r *		IV.	Not Eclipsed.	

## SEPTEMBER.

III. Eclipse	Reapp.	d <sup>d</sup> h <sup>h</sup> m <sup>m</sup> s <sup>s</sup>	1 1 24 5.7	I. Occult.	Reapp.	d <sup>d</sup> h <sup>h</sup> m <sup>m</sup> s <sup>s</sup>	1 20 2 *
III. Occult.	Disapp.		1 4 57	II. Eclipse	Disapp.		2 1 22 31.7
III. Occult.	Reapp.		1 6 35	II. Eclipse	Reapp.		2 3 37 52.1
I. Eclipse	Disapp. W.		1 16 35 10.1	II. Occult.	Disapp.		2 4 0

# JUPITER'S SATELLITES, 1869. 473

WASHINGTON MEAN TIME.

## SEPTEMBER.

		d	h	m	s			d	h	m	s
II. Occult.	Reapp.	2	6	16		I. Shadow	Ingress W.	9	15	48	
I. Shadow	Ingress W.	2	13	53		I. Transit	Ingress W.	9	17	2	
I. Transit	Ingress W.	2	15	12		I. Shadow	Egress	9	18	0	
I. Shadow	Egress W.	2	16	6		I. Transit	Egress	9	19	13	
I. Transit	Egress	2	17	23		I. Eclipse	Disapp. W.	10	12	57	29.8
I. Eclipse	Disapp. W.	3	11	3	36.0	I. Occult.	Reapp. W.	10	16	20	
I. Occult.	Reapp. W.	3	14	30		II. Shadow	Ingress	10	22	6	
II. Shadow	Ingress	3	19	31		II. Shadow	Egress	11	0	27	
II. Shadow	Egress	3	21	52		II. Transit	Ingress	11	0	36	
II. Transit	Ingress	3	22	9		II. Transit	Egress	11	2	51	
II. Transit	Egress	4	0	25		I. Shadow	Ingress W.	11	10	16	
I. Shadow	Ingress	4	8	22		I. Transit	Ingress W.	11	11	29	
I. Transit	Ingress	4	9	39		I. Shadow	Egress W.	11	12	28	
I. Shadow	Egress W.	4	10	34		I. Transit	Egress W.	11	13	40	
I. Transit	Egress W.	4	11	50		III. Shadow	Ingress	11	17	37	
III. Shadow	Ingress W.	4	13	36		III. Shadow	Egress	11	19	44	
III. Shadow	Egress W.	4	15	44		III. Transit	Ingress	11	22	45	
III. Transit	Ingress	4	19	1		III. Transit	Egress	12	0	19	
III. Transit	Egress	4	20	38		I. Eclipse	Disapp.	12	7	26	2.2
I. Eclipse	Disapp.	5	5	32	7.0	I. Occult.	Reapp. W.	12	10	47	
I. Occult.	Reapp.	5	8	58		II. Eclipse	Disapp. W.	12	17	16	55.8
II. Eclipse	Disapp. W.	5	14	40	53.6	II. Eclipse	Reapp.	12	19	32	13.4
II. Eclipse	Reapp. W.	5	16	56	13.0	II. Occult.	Disapp.	12	19	41	
II. Occult.	Disapp.	5	17	15		II. Occult.	Reapp.	12	21	56	
II. Occult.	Reapp.	5	19	30		I. Shadow	Ingress	13	4	45	
I. Shadow	Ingress	6	2	51		I. Transit	Ingress	13	5	56	
I. Transit	Ingress	6	4	7		I. Shadow	Egress	13	6	57	
I. Shadow	Egress	6	5	3		I. Transit	Egress	13	8	7	
I. Transit	Egress	6	6	18		I. Eclipse	Disapp.	14	1	54	29.9
I. Eclipse	Disapp.	7	0	0	33.6	I. Occult.	Reapp.	14	5	14	
I. Occult.	Reapp.	7	3	25		II. Shadow	Ingress W.	14	11	24	
II. Shadow	Ingress	7	8	49		II. Shadow	Egress W.	14	13	45	
II. Shadow	Egress W.	7	11	10		II. Transit	Ingress W.	14	13	48	
II. Transit	Ingress W.	7	11	23		II. Transit	Egress W.	14	16	3	
II. Transit	Egress W.	7	13	38		I. Shadow	Ingress	14	23	13	
I. Shadow	Ingress	7	21	19		I. Transit	Ingress	15	0	23	
I. Transit	Ingress	7	22	34		I. Shadow	Egress	15	1	25	
I. Shadow	Egress	7	23	31		I. Transit	Egress	15	2	34	
I. Transit	Egress	8	0	45		III. Eclipse	Disapp.	15	7	34	0.4
III. Eclipse	Disapp.	8	3	33	0.8	III. Eclipse	Reapp. W.	15	9	24	42.6
III. Eclipse	Reapp.	8	5	24	16.6	III. Occult.	Disapp. W.	15	12	24	
III. Occult.	Disapp.	8	8	43		III. Occult.	Reapp. W.	15	13	57	
III. Occult.	Reapp. W.	8	10	18		I. Eclipse	Disapp.	15	20	23	1.1
I. Eclipse	Disapp.	8	18	29	3.3	I. Occult.	Reapp.	15	23	41	
I. Occult.	Reapp.	8	21	53		II. Eclipse	Disapp.	16	6	34	40.7
II. Eclipse	Disapp.	9	3	58	39.9	II. Eclipse	Reapp.	16	8	49	57.7
II. Eclipse	Reapp.	9	6	13	58.3	II. Occult.	Disapp.	16	8	53	
II. Occult.	Disapp.	9	6	28		II. Occult.	Reapp. W.	16	11	8	
II. Occult.	Reapp.	9	8	43		I. Shadow	Ingress	16	17	42	

# 474 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

## SEPTEMBER.

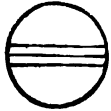
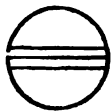
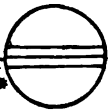
		d	h	m	s			d	h	m	s
I. Transit	Ingress	16	18	50		I. Shadow	Egress	23	21	48	
I. Shadow	Egress	16	19	54		I. Transit	Egress	23	22	49	
I. Transit	Egress	16	21	1		I. Eclipse	Disapp. W.	24	16	45	33.3
I. Eclipse	Disapp. W.	17	14	51	28.5	I. Occult.	Reapp.	24	19	56	
I. Occult.	Reapp.	17	18	8		II. Shadow	Ingress	25	3	18	
II. Shadow	Ingress	18	0	42		II. Transit	Ingress	25	5	22	
II. Transit	Ingress	18	3	0		II. Shadow	Egress	25	5	39	
II. Shadow	Egress	18	3	3		II. Transit	Egress	25	7	37	
II. Transit	Egress	18	5	15		I. Shadow	Ingress W.	25	14	4	
I. Shadow	Ingress W.	18	12	10		I. Transit	Ingress W.	25	15	5	
I. Transit	Ingress W.	18	13	17		I. Shadow	Egress W.	25	16	16	
I. Shadow	Egress W.	18	14	22		I. Transit	Egress W.	25	17	16	
I. Transit	Egress W.	18	15	28		III. Shadow	Ingress	26	1	38	
III. Shadow	Ingress	18	21	37		III. Shadow	Egress	26	3	44	
III. Shadow	Egress	18	23	44		III. Transit	Ingress	26	5	57	
III. Transit	Ingress	19	2	23		III. Transit	Egress	26	7	27	
III. Transit	Egress	19	3	55		I. Eclipse	Disapp. W.	26	11	14	8.7
I. Eclipse	Disapp. W.	19	9	20	2.4	I. Occult.	Reapp. W.	26	14	22	
I. Occult.	Reapp. W.	19	12	35		II. Eclipse	Disapp.	26	22	28	39.8
II. Eclipse	Disapp.	19	19	52	51.0	II. Occult.	Reapp.	27	2	41	
II. Occult.	Reapp.	20	0	20		I. Shadow	Ingress W.	27	8	33	
I. Shadow	Ingress	20	6	39		I. Transit	Ingress W.	27	9	32	
I. Transit	Ingress	20	7	44		I. Shadow	Egress W.	27	10	45	
I. Shadow	Egress	20	8	51		I. Transit	Egress W.	27	11	43	
I. Transit	Egress W.	20	9	55		I. Eclipse	Disapp.	28	5	42	39.4
I. Eclipse	Disapp.	21	3	48	31.2	I. Occult.	Reapp. W.	28	8	49	
I. Occult.	Reapp.	21	7	2		II. Shadow	Ingress W.	28	16	36	
II. Shadow	Ingress W.	21	14	0		II. Transit	Ingress	28	18	33	
II. Transit	Ingress W.	21	16	12		II. Shadow	Egress	28	18	57	
II. Shadow	Egress W.	21	16	21		II. Transit	Egress	28	20	47	
II. Transit	Egress	21	18	26		I. Shadow	Ingress	29	3	1	
I. Shadow	Ingress	22	1	7		I. Transit	Ingress	29	3	58	
I. Transit	Ingress	22	2	11		I. Shadow	Egress	29	5	13	
I. Shadow	Egress	22	3	19		I. Transit	Egress	29	6	9	
I. Transit	Egress	22	4	22		III. Eclipse	Disapp. W.	29	15	35	0.0
III. Eclipse	Disapp. W.	22	11	34	30.8	III. Eclipse	Reapp. W.	29	17	24	45.7
III. Eclipse	Reapp. W.	22	13	24	44.8	III. Occult.	Disapp.	29	19	30	
III. Occult.	Disapp. W.	22	16	0		III. Occult.	Reapp.	29	21	0	
III. Occult.	Reapp.	22	17	31		I. Eclipse	Disapp.	30	0	11	13.7
I. Eclipse	Disapp.	22	22	17	4.1	I. Occult.	Reapp.	30	3	16	
I. Occult.	Reapp.	23	1	29		II. Eclipse	Disapp. W.	30	11	46	22.7
II. Eclipse	Disapp. W.	23	9	10	34.8	II. Occult.	Reapp. W.	30	15	51	
II. Occult.	Reapp. W.	23	13	31		I. Shadow	Ingress	30	21	30	
I. Shadow	Ingress	23	19	36		I. Transit	Ingress	30	22	25	
I. Transit	Ingress	23	20	38		I. Shadow	Egress	30	23	42	

# JUPITER'S SATELLITES, 1869. 475

WASHINGTON MEAN TIME.

SEPTEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.	d *		III.	d *    r *	
II.	d *    r *		IV.	Not Eclipsed.	

OCTOBER.

			d	h	m	s				d	h	m	s
I.	Transit	Egress	1	0	36		I.	Shadow	Egress	6	7	7	
I.	Eclipse	Disapp.	1	18	39	44.4	I.	Transit	Egress W.	6	7	55	
I.	Occult.	Reapp.	1	21	42		III.	Eclipse	Disapp.	6	19	35	43.2
II.	Shadow	Ingress	2	5	54		III.	Eclipse	Reapp.	6	21	25	3.2
II.	Transit	Ingress	2	7	43		III.	Occult.	Disapp.	6	22	56	
II.	Shadow	Egress W.	2	8	15		III.	Occult.	Reapp.	7	0	26	
II.	Transit	Egress W.	2	9	57		I.	Eclipse	Disapp.	7	2	5	25.8
I.	Shadow	Ingress W.	2	15	58		I.	Occult.	Reapp.	7	5	1	
I.	Transit	Ingress W.	2	16	51		II.	Eclipse	Disapp. W.	7	14	22	5.7
I.	Shadow	Egress	2	18	10		II.	Occult.	Reapp.	7	18	9	
I.	Transit	Egress	2	19	2		I.	Shadow	Ingress	7	23	24	
III.	Shadow	Ingress	3	5	40		I.	Transit	Ingress	8	0	11	
III.	Shadow	Egress	3	7	45		I.	Shadow	Egress	8	1	36	
III.	Transit	Ingress W.	3	9	25		I.	Transit	Egress	8	2	21	
III.	Transit	Egress W.	3	10	55		I.	Eclipse	Disapp.	8	20	34	2.7
I.	Eclipse	Disapp. W.	3	13	8	21.7	I.	Occult.	Reapp.	8	23	28	
I.	Occult.	Reapp. W.	3	16	9		II.	Shadow	Ingress W.	9	8	30	
II.	Eclipse	Disapp.	4	1	4	23.4	II.	Transit	Ingress W.	9	10	1	
II.	Occult.	Reapp.	4	5	0		II.	Shadow	Egress W.	9	10	51	
I.	Shadow	Ingress W.	4	10	27		II.	Transit	Egress W.	9	12	15	
I.	Transit	Ingress W.	4	11	18		I.	Shadow	Ingress W.	9	17	53	
I.	Shadow	Egress W.	4	12	39		I.	Transit	Ingress	9	18	37	
I.	Transit	Egress W.	4	13	29		I.	Shadow	Egress	9	20	4	
I.	Eclipse	Disapp.	5	7	36	53.9	I.	Transit	Egress	9	20	47	
I.	Occult.	Reapp. W.	5	10	35		III.	Shadow	Ingress W.	10	9	41	
II.	Shadow	Ingress	5	19	12		III.	Shadow	Egress W.	10	11	46	
II.	Transit	Ingress	5	20	52		III.	Transit	Ingress W.	10	12	50	
II.	Shadow	Egress	5	21	33		III.	Transit	Egress W.	10	14	19	
II.	Transit	Egress	5	23	6		I.	Eclipse	Disapp. W.	10	15	2	42.0
I.	Shadow	Ingress	6	4	55		I.	Occult.	Reapp. W.	10	17	54	
I.	Transit	Ingress	6	5	44		II.	Eclipse	Disapp.	11	3	40	2.2

# 476 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

## OCTOBER.

		d	h	m	s			d	h	m	s
II. Occult.	Reapp.	11	7	18		I. Eclipse	Disapp. W.	19	11	25	46.9
I. Shadow	Ingress W.	11	12	21		I. Occult.	Reapp. W.	19	14	4	
I. Transit	Ingress W.	11	13	3		II. Shadow	Ingress	20	0	25	
I. Shadow	Egress W.	11	14	33		II. Transit	Ingress	20	1	26	
I. Transit	Egress W.	11	15	13		II. Shadow	Egress	20	2	46	
I. Eclipse	Disapp. W.	12	9	31	16.2	II. Transit	Egress	20	3	40	
I. Occult.	Reapp. W.	12	12	20		I. Shadow	Ingress W.	20	8	44	
II. Shadow	Ingress	12	21	48		I. Transit	Ingress W.	20	9	13	
II. Transit	Ingress	12	23	9		I. Shadow	Egress W.	20	10	56	
II. Shadow	Egress	13	0	9		I. Transit	Egress W.	20	11	23	
II. Transit	Egress	13	1	24		III. Eclipse	Disapp.	21	3	38	18.6
I. Shadow	Ingress	13	6	50		III. Eclipse	Reapp.	21	5	26	53.6
I. Transit	Ingress W.	13	7	29		III. Occult.	Disapp.	21	5	38	
I. Shadow	Egress W.	13	9	2		I. Eclipse	Disapp.	21	5	54	27.8
I. Transit	Egress W.	13	9	39		III. Occult.	Reapp. W.	21	7	7	
III. Eclipse	Disapp.	13	23	36	38.7	I. Occult.	Reapp. W.	21	8	30	
III. Eclipse	Reapp.	14	1	25	35.1	II. Eclipse	Disapp.	21	19	33	19.9
III. Occult.	Disapp.	14	2	19		II. Occult.	Reapp.	21	22	40	
III. Occult.	Reapp.	14	3	48		I. Shadow	Ingress	22	3	12	
I. Eclipse	Disapp.	14	3	59	54.9	I. Transit	Ingress	22	3	39	
I. Occult.	Reapp.	14	6	46		I. Shadow	Egress	22	5	25	
II. Eclipse	Disapp. W.	14	16	57	44.3	I. Transit	Egress	22	5	49	
II. Occult.	Reapp.	14	20	26		I. Eclipse	Disapp.	23	0	23	3.8
I. Shadow	Ingress	15	1	18		I. Occult.	Reapp.	23	2	56	
I. Transit	Ingress	15	1	55		II. Shadow	Ingress W.	23	13	43	
I. Shadow	Egress	15	3	31		II. Transit	Ingress W.	23	14	33	
I. Transit	Egress	15	4	5		II. Shadow	Egress W.	23	16	4	
I. Eclipse	Disapp.	15	22	28	29.0	II. Transit	Egress W.	23	16	48	
I. Occult.	Reapp.	16	1	12		I. Shadow	Ingress	23	21	41	
II. Shadow	Ingress W.	16	11	6		I. Transit	Ingress	23	22	5	
II. Transit	Ingress W.	16	12	18		I. Shadow	Egress	23	23	53	
II. Shadow	Egress W.	16	13	27		I. Transit	Egress	24	0	15	
II. Transit	Egress W.	16	14	32		III. Shadow	Ingress W.	24	17	42	
I. Shadow	Ingress	16	19	47		I. Eclipse	Disapp.	24	18	51	47.5
I. Transit	Ingress	16	20	21		III. Transit	Ingress	24	19	26	
I. Shadow	Egress	16	21	59		III. Shadow	Egress	24	19	46	
I. Transit	Egress	16	22	31		III. Transit	Egress	24	20	57	
III. Shadow	Ingress W.	17	13	41		I. Occult.	Reapp.	24	21	22	
III. Shadow	Egress W.	17	15	46		II. Eclipse	Disapp. W.	25	8	51	10.0
III. Transit	Ingress W.	17	16	10		II. Occult.	Reapp. W.	25	11	48	
I. Eclipse	Disapp. W.	17	16	57	10.6	I. Shadow	Ingress W.	25	16	9	
III. Transit	Egress W.	17	17	39		I. Transit	Ingress W.	25	16	30	
I. Occult.	Reapp.	17	19	38		I. Shadow	Egress	25	18	22	
II. Eclipse	Disapp.	18	6	15	37.5	I. Transit	Egress	25	18	41	
II. Occult.	Reapp. W.	18	9	33		I. Eclipse	Disapp. W.	26	13	20	26.0
I. Shadow	Ingress W.	18	14	15		I. Occult.	Reapp. W.	26	15	48	
I. Transit	Ingress W.	18	14	47		II. Shadow	Ingress	27	3	2	
I. Shadow	Egress W.	18	16	28		II. Transit	Ingress	27	3	41	
I. Transit	Egress W.	18	16	57		II. Shadow	Egress	27	5	23	

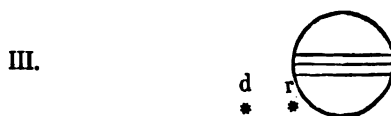
# JUPITER'S SATELLITES, 1869. 477

WASHINGTON MEAN TIME.

## OCTOBER.

II. Transit	Egress	<sup>d</sup> 27 <sup>h</sup> 5 <sup>m</sup> 56 <sup>s</sup>	I. Eclipse	Disapp.	<sup>d</sup> 30 <sup>h</sup> 2 <sup>m</sup> 17 <sup>s</sup> 47.6
I. Shadow	Ingress W.	27 10 38	I. Occult.	Reapp.	30 4 40
I. Transit	Ingress W.	27 10 56	II. Shadow	Ingress W.	30 16 20
I. Shadow	Egress W.	27 12 50	II. Transit	Ingress W.	30 16 49
I. Transit	Egress W.	27 13 7	II. Shadow	Egress	30 18 41
III. Eclipse	Disapp. W.	28 7 39 36.3	II. Transit	Egress	30 19 3
I. Eclipse	Disapp. W.	28 7 49 9.4	I. Shadow	Ingress	30 23 35
I. Occult.	Reapp. W.	28 10 14	I. Transit	Ingress	30 23 48
III. Occult.	Reapp. W.	28 10 26	I. Shadow	Egress	31 1 48
II. Eclipse	Disapp.	28 22 8 52.5	I. Transit	Egress	31 1 59
II. Occult.	Reapp.	29 0 55	I. Eclipse	Disapp.	31 20 46 33.6
I. Shadow	Ingress	29 5 6	III. Shadow	Ingress	31 21 42
I. Transit	Ingress	29 5 22	III. Transit	Ingress	31 22 40
I. Shadow	Egress W.	29 7 19	I. Occult.	Reapp.	31 23 6
I. Transit	Egress W.	29 7 32	III. Shadow	Egress	31 23 46

Phases of the Eclipses of the Satellites for an Inverting Telescope.



IV. Not Eclipsed.

## NOVEMBER.

III. Transit	Egress	<sup>d</sup> 1 <sup>h</sup> 0 <sup>m</sup> 14 <sup>s</sup>	I. Shadow	Egress W.	<sup>d</sup> 3 <sup>h</sup> 14 <sup>m</sup> 45 <sup>s</sup>
II. Eclipse	Disapp. W.	1 11 26 40.8	I. Transit	Egress W.	3 14 51
II. Occult.	Reapp. W.	1 14 2	I. Eclipse	Disapp. W.	4 9 44 0.2
I. Shadow	Ingress W.	1 18 3	III. Eclipse	Disapp. W.	4 11 41 14.0
I. Transit	Ingress	1 18 14	I. Occult.	Reapp. W.	4 11 58
I. Shadow	Egress	1 20 17	III. Occult.	Reapp. W.	4 13 43
I. Transit	Egress	1 20 25	II. Eclipse	Disapp.	5 0 44 24.1
I. Eclipse	Disapp. W.	2 15 15 14.4	II. Occult.	Reapp.	5 3 8
I. Occult.	Reapp. W.	2 17 32	I. Shadow	Ingress W.	5 7 0
II. Shadow	Ingress	3 5 39	I. Transit	Ingress W.	5 7 5
II. Transit	Ingress	3 5 56	I. Shadow	Egress W.	5 9 14
II. Shadow	Egress W.	3 8 0	I. Transit	Egress W.	5 9 16
II. Transit	Egress W.	3 8 11	I. Eclipse	Disapp.	6 4 12 40.5
I. Shadow	Ingress W.	3 12 32	I. Occult.	Reapp. W.	6 6 24
I. Transit	Ingress W.	3 12 40	II. Shadow	Ingress	6 18 57

# 478 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

NOVEMBER.

		d	h	m	s			d	h	m	s
II.	Transit	Ingress	6	19	3		I.	Occult.	Disapp.	15	0 23
II.	Transit	Egress	6	21	18		I.	Eclipse	Reapp.	15	2 44 11.3
II.	Shadow	Egress	6	21	19		III.	Transit	Ingress	15	5 7
I.	Shadow	Ingress	7	1	30		III.	Shadow	Ingress	15	5 45
I.	Transit	Ingress	7	1	31		III.	Transit	Egress W.	15	6 48
I.	Transit	Egress	7	3	42		III.	Shadow	Egress W.	15	7 49
I.	Shadow	Egress	7	3	42		II.	Occult.	Disapp. W.	15	16 12
I.	Occult.	Disapp.	7	22	39		II.	Eclipse	Reapp.	15	18 53 13.4
I.	Occult.	Reapp.	8	0	50		I.	Transit	Ingress	15	21 41
III.	Shadow	Ingress	8	1	44		I.	Shadow	Ingress	15	21 53
III.	Transit	Ingress	8	1	53		I.	Transit	Egress	15	23 52
III.	Transit	Egress	8	3	31		I.	Shadow	Egress	16	0 6
III.	Shadow	Egress	8	3	48		I.	Occult.	Disapp.	16	18 49
II.	Occult.	Disapp. W.	8	13	59		I.	Eclipse	Reapp.	16	21 12 56.9
II.	Eclipse	Reapp. W.	8	16	17 33.4		II.	Transit	Ingress W.	17	10 26
I.	Transit	Ingress	8	19	57		II.	Shadow	Ingress W.	17	10 54
I.	Shadow	Ingress	8	19	58		II.	Transit	Egress W.	17	12 42
I.	Transit	Egress	8	22	8		II.	Shadow	Egress W.	17	13 15
I.	Shadow	Egress	8	22	11		I.	Transit	Ingress W.	17	16 7
I.	Occult.	Disapp. W.	9	17	5		I.	Shadow	Ingress W.	17	16 22
I.	Eclipse	Reapp.	9	19	17 47.7		I.	Transit	Egress	17	18 18
II.	Transit	Ingress W.	10	8	10		I.	Shadow	Egress	17	18 34
II.	Shadow	Ingress W.	10	8	16		I.	Occult.	Disapp. W.	18	13 15
II.	Transit	Egress W.	10	10	25		I.	Eclipse	Reapp. W.	18	15 41 48.4
II.	Shadow	Egress W.	10	10	37		III.	Occult.	Disapp.	18	18 34
I.	Transit	Ingress W.	10	14	23		III.	Eclipse	Reapp.	18	21 31 14.8
I.	Shadow	Ingress W.	10	14	27		II.	Occult.	Disapp.	19	5 18
I.	Transit	Egress W.	10	16	34		II.	Eclipse	Reapp. W.	19	8 11 0.8
I.	Shadow	Egress W.	10	16	39		I.	Transit	Ingress W.	19	10 33
I.	Occult.	Disapp. W.	11	11	31		I.	Shadow	Ingress W.	19	10 50
I.	Eclipse	Reapp. W.	11	13	46 36.7		I.	Transit	Egress W.	19	12 44
III.	Occult.	Disapp. W.	11	15	20		I.	Shadow	Egress W.	19	13 3
III.	Eclipse	Reapp. W.	11	17	30 11.9		I.	Occult.	Disapp. W.	20	7 41
II.	Occult.	Disapp.	12	3	5		I.	Eclipse	Reapp. W.	20	10 10 33.6
II.	Eclipse	Reapp.	12	5	35 25.4		II.	Transit	Ingress	20	23 33
I.	Transit	Ingress W.	12	8	49		II.	Shadow	Ingress	21	0 13
I.	Shadow	Ingress W.	12	8	56		II.	Transit	Egress	21	1 49
I.	Transit	Egress W.	12	11	0		II.	Shadow	Egress	21	2 34
I.	Shadow	Egress W.	12	11	8		I.	Transit	Ingress	21	4 59
I.	Occult.	Disapp.	13	5	57		I.	Shadow	Ingress	21	5 19
I.	Eclipse	Reapp. W.	13	8	15 19.8		I.	Transit	Egress W.	21	7 10
II.	Transit	Ingress	13	21	18		I.	Shadow	Egress W.	21	7 31
II.	Shadow	Ingress	13	21	35		I.	Occult.	Disapp.	22	2 7
II.	Transit	Egress	13	23	33		I.	Eclipse	Reapp.	22	4 39 27.1
II.	Shadow	Egress	13	23	56		III.	Transit	Ingress W.	22	8 22
I.	Transit	Ingress	14	3	15		III.	Shadow	Ingress W.	22	9 47
I.	Shadow	Ingress	14	3	24		III.	Transit	Egress W.	22	10 6
I.	Transit	Egress	14	5	26		III.	Shadow	Egress W.	22	11 50
I.	Shadow	Egress	14	5	37		II.	Occult.	Disapp.	22	18 25



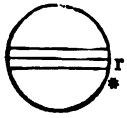
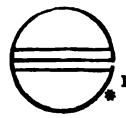
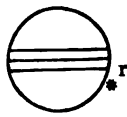
# JUPITER'S SATELLITES, 1869. 479

## WASHINGTON MEAN TIME.

### NOVEMBER.

II. Eclipse	Reapp.	d <sup>d</sup> h <sup>h</sup> m <sup>m</sup> s <sup>s</sup>	22 21 28 49.0	I. Transit	Egress W.	d <sup>d</sup> h <sup>h</sup> m <sup>m</sup> s <sup>s</sup>	26 14 28
I. Transit	Ingress		22 23 25	I. Shadow	Egress W.		26 14 58
I. Shadow	Ingress		22 23 48	I. Occult.	Disapp. W.		27 9 26
I. Transit	Egress		23 1 36	I. Eclipse	Reapp. W.		27 12 5 55.6
I. Shadow	Egress		23 2 0	II. Transit	Ingress		28 1 50
I. Occult.	Disapp.		23 20 34	II. Shadow	Ingress		28 2 51
I. Eclipse	Reapp.		23 23 8 15.0	II. Transit	Egress		28 4 7
II. Transit	Ingress W.		24 12 41	II. Shadow	Egress		28 5 12
II. Shadow	Ingress W.		24 13 32	I. Transit	Ingress W.		28 6 43
II. Transit	Egress W.		24 14 58	I. Shadow	Ingress W.		28 7 14
II. Shadow	Egress W.		24 15 53	I. Transit	Egress W.		28 8 54
I. Transit	Ingress		24 17 51	I. Shadow	Egress W.		28 9 26
I. Shadow	Ingress		24 18 16	I. Occult.	Disapp.		29 3 52
I. Transit	Egress		24 20 2	I. Eclipse	Reapp. W.		29 6 34 51.0
I. Shadow	Egress		24 20 29	III. Transit	Ingress W.		29 11 39
I. Occult.	Disapp. W.		25 15 0	III. Transit	Egress W.		29 13 28
I. Eclipse	Reapp.		25 17 37 8.5	III. Shadow	Ingress W.		29 13 48
III. Occult.	Disapp.		25 21 49	III. Shadow	Egress W.		29 15 52
III. Occult.	Reapp.		25 23 36	II. Occult.	Disapp.		29 20 40
III. Eclipse	Disapp.		25 23 45 14.4	II. Eclipse	Reapp.		30 0 4 25.5
III. Eclipse	Reapp.		26 1 32 38.2	I. Transit	Ingress		30 1 9
II. Occult.	Disapp. W.		26 7 32	I. Shadow	Ingress		30 1 42
II. Eclipse	Reapp. W.		26 10 46 37.2	I. Transit	Egress		30 3 20
I. Transit	Ingress W.		26 12 17	I. Shadow	Egress		30 3 55
I. Shadow	Ingress W.		26 12 45	I. Occult.	Disapp.		30 22 18

### Phases of the Eclipses of the Satellites for an Inverting Telescope.

I.		III.	
II.		IV.	Not Eclipsed.

### DECEMBER.

I. Eclipse	Reapp.	d <sup>d</sup> h <sup>h</sup> m <sup>m</sup> s <sup>s</sup>	1 1 3 41.0	II. Shadow	Egress	d <sup>d</sup> h <sup>h</sup> m <sup>m</sup> s <sup>s</sup>	1 18 31
II. Transit	Ingress W.		1 14 59	I. Transit	Ingress		1 19 35
II. Shadow	Ingress		1 16 10	I. Shadow	Ingress		1 20 11
II. Transit	Egress		1 17 16	I. Transit	Egress		1 21 46

# 480 JUPITER'S SATELLITES, 1869.

WASHINGTON MEAN TIME.

## DECEMBER.

		d	h	m	s			d	h	m	s
I.	Shadow	Egress	1	22	24		III.	Eclipse	Disapp. W.	10	7 49 27.8
I.	Occult.	Disapp.	2	16	45		III.	Eclipse	Reapp. W.	10	9 36 40.0
I.	Eclipse	Reapp.	2	19	32 36.5		II.	Occult.	Disapp. W.	10	12 5
III.	Occult.	Disapp.	3	1	8		I.	Transit	Ingress W.	10	15 47
III.	Occult.	Reapp.	3	2	59		II.	Eclipse	Reapp.	10	15 57 54.9
III.	Eclipse	Disapp.	3	3	46 59.2		I.	Shadow	Ingress	10	16 35
III.	Eclipse	Reapp.	3	5	34 16.0		I.	Transit	Egress	10	17 58
II.	Occult.	Disapp. W.	3	9	48		I.	Shadow	Egress	10	18 48
II.	Eclipse	Reapp. W.	3	13	22 15.1		I.	Occult.	Disapp. W.	11	12 58
I.	Transit	Ingress W.	3	14	1		I.	Eclipse	Reapp.	11	15 57 3.2
I.	Shadow	Ingress W.	3	14	40		II.	Transit	Ingress W.	12	6 29
I.	Transit	Egress	3	16	12		II.	Shadow	Ingress W.	12	8 7
I.	Shadow	Egress	3	16	53		II.	Transit	Egress W.	12	8 47
I.	Occult.	Disapp. W.	4	11	11		I.	Transit	Ingress W.	12	10 14
I.	Eclipse	Reapp. W.	4	14	1 25.7		II.	Shadow	Egress W.	12	10 29
II.	Transit	Ingress W.	5	4	8		I.	Shadow	Ingress W.	12	11 4
II.	Shadow	Ingress	5	5	29		I.	Transit	Egress W.	12	12 25
II.	Transit	Egress W.	5	6	26		I.	Shadow	Egress W.	12	13 16
II.	Shadow	Egress W.	5	7	50		I.	Occult.	Disapp. W.	13	7 25
I.	Transit	Ingress W.	5	8	28		I.	Eclipse	Reapp. W.	13	10 26 2.1
I.	Shadow	Ingress W.	5	9	9		III.	Transit	Ingress	13	18 22
I.	Transit	Egress W.	5	10	39		III.	Transit	Egress	13	20 20
I.	Shadow	Egress W.	5	11	21		III.	Shadow	Ingress	13	21 51
I.	Occult.	Disapp. W.	6	5	38		III.	Shadow	Egress	13	23 54
I.	Eclipse	Reapp. W.	6	8	30 22.9		II.	Occult.	Disapp.	14	1 14
III.	Transit	Ingress W.	6	14	58		I.	Transit	Ingress	14	4 40
III.	Transit	Egress	6	16	52		II.	Eclipse	Reapp.	14	5 15 45.0
III.	Shadow	Ingress	6	17	49		I.	Shadow	Ingress W.	14	5 33
III.	Shadow	Egress	6	19	53		I.	Transit	Egress W.	14	6 51
II.	Occult.	Disapp.	6	22	56		I.	Shadow	Egress W.	14	7 45
II.	Eclipse	Reapp.	7	2	40 4.2		I.	Occult.	Disapp.	15	1 51
I.	Transit	Ingress	7	2	54		I.	Eclipse	Reapp.	15	4 54 55.7
I.	Shadow	Ingress	7	3	38		II.	Transit	Ingress	15	19 40
I.	Transit	Egress	7	5	5		II.	Shadow	Ingress	15	21 26
I.	Shadow	Egress W.	7	5	50		II.	Transit	Egress	15	21 59
I.	Occult.	Disapp.	8	0	4		I.	Transit	Ingress	15	23 7
I.	Eclipse	Reapp.	8	2	59 14.9		II.	Shadow	Egress	15	23 48
II.	Transit	Ingress	8	17	18		I.	Shadow	Ingress	16	0 2
II.	Shadow	Ingress	8	18	48		I.	Transit	Egress	16	1 18
II.	Transit	Egress	8	19	36		I.	Shadow	Egress	16	2 14
II.	Shadow	Egress	8	21	9		I.	Occult.	Disapp.	16	20 18
I.	Transit	Ingress	8	21	21		I.	Eclipse	Reapp.	16	23 23 54.9
I.	Shadow	Ingress	8	22	7		III.	Occult.	Disapp. W.	17	7 57
I.	Transit	Egress	8	23	32		III.	Occult.	Reapp. W.	17	9 57
I.	Shadow	Egress	9	0	19		III.	Eclipse	Disapp. W.	17	11 51 31.1
I.	Occult.	Disapp.	9	18	31		III.	Eclipse	Reapp. W.	17	13 38 41.1
I.	Eclipse	Reapp.	9	21	28 12.3		II.	Occult.	Disapp. W.	17	14 24
III.	Occult.	Disapp.	10	4	30		I.	Transit	Ingress	17	17 33
III.	Occult.	Reapp. W.	10	6	26		I.	Shadow	Ingress	17	18 30

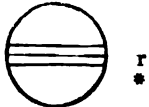

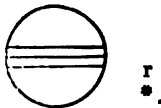
# JUPITER'S SATELLITES, 1869. 481

## WASHINGTON MEAN TIME.

### DECEMBER.

			d	h	m	s				d	h	m	s
II.	Eclipse	Reapp.	17	18	33	36.9	I.	Transit	Egress	24	21	33	
I.	Transit	Egress	17	19	45		I.	Shadow	Egress	24	22	38	
I.	Shadow	Egress	17	20	43		I.	Occult.	Disapp.	25	16	33	
I.	Occult.	Disapp. W.	18	14	45		I.	Eclipse	Reapp.	25	19	48	35.6
I.	Eclipse	Reapp.	18	17	52	47.0	II.	Transit	Ingress W.	26	11	17	
II.	Transit	Ingress W.	19	8	52		II.	Shadow	Ingress W.	26	13	24	
II.	Shadow	Ingress W.	19	10	46		II.	Transit	Egress W.	26	13	37	
II.	Transit	Egress W.	19	11	11		I.	Transit	Ingress W.	26	13	48	
I.	Transit	Ingress W.	19	12	0		I.	Shadow	Ingress	26	14	54	
I.	Shadow	Ingress W.	19	12	59		II.	Shadow	Egress	26	15	46	
II.	Shadow	Egress W.	19	13	7		I.	Transit	Egress	26	16	0	
I.	Transit	Egress W.	19	14	12		I.	Shadow	Egress	26	17	6	
I.	Shadow	Egress	19	15	11		I.	Occult.	Disapp. W	27	11	0	
I.	Occult.	Disapp. W.	20	9	12		I.	Eclipse	Reapp.	27	14	17	37.8
I.	Eclipse	Reapp. W.	20	12	21	47.4	III.	Transit	Ingress	28	1	24	
III.	Transit	Ingress	20	21	50		III.	Transit	Egress	28	3	29	
III.	Transit	Egress	20	23	51		III.	Shadow	Ingress W.	28	5	54	
III.	Shadow	Ingress	21	1	52		II.	Occult.	Disapp. W.	28	5	58	
II.	Occult.	Disapp.	21	3	35		III.	Shadow	Egress W.	28	7	56	
III.	Shadow	Egress	21	3	55		I.	Transit	Ingress W.	28	8	15	
I.	Transit	Ingress W.	21	6	27		I.	Shadow	Ingress W.	28	9	23	
I.	Shadow	Ingress W.	21	7	28		II.	Eclipse	Reapp. W.	28	10	27	13.6
II.	Eclipse	Reapp. W.	21	7	51	28.0	I.	Transit	Egress W.	28	10	28	
I.	Transit	Egress W.	21	8	39		I.	Shadow	Egress W.	28	11	35	
I.	Shadow	Egress W.	21	9	40		I.	Occult.	Disapp. W.	29	5	28	
I.	Occult.	Disapp.	22	3	39		I.	Eclipse	Reapp. W.	29	8	46	32.8
I.	Eclipse	Reapp. W.	22	6	50	41.9	II.	Transit	Ingress	30	0	30	
II.	Transit	Ingress	22	22	4		I.	Transit	Ingress	30	2	42	
II.	Shadow	Ingress	23	0	5		II.	Shadow	Ingress	30	2	44	
II.	Transit	Egress	23	0	24		II.	Transit	Egress	30	2	51	
I.	Transit	Ingress	23	0	54		I.	Shadow	Ingress	30	3	52	
I.	Shadow	Ingress	23	1	57		I.	Transit	Egress	30	4	54	
II.	Shadow	Egress	23	2	27		II.	Shadow	Egress	30	5	6	
I.	Transit	Egress	23	3	6		I.	Shadow	Egress W.	30	6	4	
I.	Shadow	Egress	23	4	9		I.	Occult.	Disapp.	30	23	56	
I.	Occult.	Disapp.	23	22	6		I.	Eclipse	Reapp.	31	3	15	34.5
I.	Eclipse	Reapp.	24	1	19	43.0	III.	Occult.	Disapp.	31	15	5	
III.	Occult.	Disapp. W.	24	11	29		III.	Occult.	Reapp.	31	17	12	
III.	Occult.	Reapp. W.	24	13	32		II.	Occult.	Disapp.	31	19	10	
III.	Eclipse	Disapp.	24	15	53	49.4	III.	Eclipse	Disapp.	31	19	55	40.6
II.	Occult.	Disapp.	24	16	46		I.	Transit	Ingress	31	21	9	
III.	Eclipse	Reapp.	24	17	40	59.6	III.	Eclipse	Reapp.	31	21	42	52.6
I.	Transit	Ingress	24	19	21		I.	Shadow	Ingress	31	22	21	
I.	Shadow	Ingress	24	20	25		I.	Transit	Egress	31	23	21	
II.	Eclipse	Reapp.	24	21	9	21.0	II.	Eclipse	Reapp.	31	23	45	8.0

**482 JUPITER'S SATELLITES, 1869.**

WASHINGTON MEAN TIME.	
DECEMBER.	
Phases of the Eclipses of the Satellites for an Inverting Telescope.	
I. 	III. 
II. 	IV. Not Eclipsed.

# JUPITER'S SATELLITES, 1869. 483

WASHINGTON MEAN TIME OF GEOCENTRIC SUPERIOR CONJUNCTION.

## SATELLITE I.

Jan.	2	<sup>h</sup> 4 <sup>m</sup> 55.0	May	22	<sup>h</sup> 2 <sup>m</sup> 45.2	Aug.	6	<sup>h</sup> 5 <sup>m</sup> 55.1	Oct.	19	<sup>h</sup> 12 <sup>m</sup> 59.2
	3	23 24.2		23	21 15.4		8	0 23.7		21	7 25.2
	5	17 53.6		25	15 45.5		9	18 52.2		23	1 51.1
	7	12 22.9		27	10 15.7		11	13 20.6		24	20 17.1
	9	6 52.3		29	4 45.8		13	7 49.0		26	14 43.1
	11	1 21.7		30	23 15.9		15	2 17.5		28	9 9.0
	12	19 51.3	June	1	17 46.0		16	20 45.8		30	3 34.9
	14	14 20.9		3	12 16.1		18	15 14.1		31	22 0.8
	16	8 50.6		5	6 46.2		20	9 42.2	Nov.	2	16 26.7
	18	3 20.3		7	1 16.2		22	4 10.3		4	10 52.7
	19	21 50.1		8	19 46.1		23	22 38.1		6	5 18.6
	21	16 19.8		10	14 16.1		25	17 6.0		7	23 44.6
	23	10 49.7		12	8 46.1		27	11 33.8		9	18 10.5
	25	5 19.5		14	3 16.1		29	6 1.6		11	12 36.5
	26	23 49.4		15	21 45.9		31	0 29.3		13	7 2.4
	28	18 19.3		17	16 15.8	Sept.	1	18 57.0		15	1 28.5
Feb.	30	12 49.3		19	10 45.6		3	13 24.5		16	19 54.4
	1	7 19.3		21	5 15.3		5	7 52.1		18	14 20.6
	3	1 49.4		22	23 45.1		7	2 19.6		20	8 46.6
	4	20 19.3		24	18 14.8		8	20 47.2		22	3 12.8
	6	14 49.5		26	12 44.5		10	15 14.2		23	21 38.9
	8	9 19.7		28	7 14.1		12	9 41.5		25	16 5.1
	10	3 49.9		30	1 43.7		14	4 8.5		27	10 31.3
	11	22 20.0	July	1	20 13.2		15	22 35.7		29	4 57.6
	13	16 50.4		3	14 42.8		17	17 2.6		30	23 23.9
	15	11 20.6		5	9 12.3		19	11 20.7	Dec.	2	17 50.3
	17	5 50.9		7	3 41.7		21	5 56.6		4	12 16.8
	19	0 21.2		8	22 11.1		23	0 23.4		6	6 43.4
	20	18 51.5		10	16 40.5		24	18 50.2		8	1 10.0
	22	13 21.9		12	11 9.8		26	13 17.0		9	19 36.7
	24	7 52.3		14	5 39.1		28	7 43.6		11	14 3.4
	26	2 22.7		16	0 8.3		30	2 10.3		13	8 30.3
	27	20 53.1		17	18 37.6	Oct.	1	20 36.8		15	2 57.1
March	1	15 23.5		19	13 6.7		3	15 3.4		16	21 24.0
	3	9 54.0		21	7 35.7		5	9 29.8		18	15 50.9
	5	4 24.4		23	2 4.7		7	3 56.2		20	10 17.9
	6	22 54.9		24	20 33.8		8	22 22.5		22	4 44.0
	8	17 25.3		26	15 2.8		10	16 48.7		23	23 12.1
	10	11 55.9		28	9 31.7		12	11 14.9		25	17 39.2
	12	6 26.3		30	4 0.5		14	5 41.0		27	12 6.4
	14	0 56.8		31	22 29.4		16	0 7.1		29	6 33.6
	15	19 27.4	Aug.	2	16 58.0		17	18 33.2		31	1 0.8
May	20	8 15.0		4	11 26.6						

## SATELLITE II.

Jan.	3	<sup>h</sup> 6 <sup>m</sup> 38.9	Jan.	31	<sup>h</sup> 17 <sup>m</sup> 27.7	March	1	<sup>h</sup> 4 <sup>m</sup> 42.6	May	25	<sup>h</sup> 15 <sup>m</sup> 11.8
	6	19 59.2		Feb. 4	6 52.8		4	18 8.2		29	4 38.0
	10	9 19.8		7	20 16.1		8	7 33.4	June	1	18 3.0
	13	22 40.5		11	9 40.0		11	20 59.3		5	7 28.8
	17	12 1.6		14	23 3.9		15	10 24.8		8	20 53.3
	21	1 23.1		18	12 28.4		18	23 51.1		12	10 18.7
	24	14 44.8		22	1 52.8	May	18	12 19.9		15	23 42.9
	28	4 7.1		25	15 17.8		22	1 46.5		19	13 7.4

# 484 JUPITER'S SATELLITES, 1869.

## WASHINGTON MEAN TIME OF GEOCENTRIC SUPERIOR CONJUNCTION.

### SATELLITE II.

June 23	<sup>h</sup> 2 <sup>m</sup> 31.5	Aug. 11	<sup>h</sup> 21 <sup>m</sup> 29.9	Sept. 30	<sup>h</sup> 14 <sup>m</sup> 43.7	Nov. 19	<sup>h</sup> 6 <sup>m</sup> 26.4
26	15 55.9	15	10 48.1	Oct. 4	3 53.2	22	19 33.5
30	5 18.9	19	0 4.9	7	17 1.9	26	8 40.8
July 3	18 42.6	22	13 21.8	11	6 10.5	29	21 48.5
7	8 4.9	26	2 37.5	14	19 18.5	Dec. 3	10 56.5
10	21 27.9	29	15 53.3	18	8 26.2	7	0 5.1
14	10 49.5	Sept. 2	5 7.8	21	21 32.4	10	13 14.2
18	0 11.6	5	18 22.3	25	10 40.4	14	2 23.8
21	13 32.4	9	7 35.5	28	23 47.1	17	15 33.9
25	2 53.6	12	20 48.7	Nov. 1	12 54.1	21	4 44.6
28	16 13.5	16	10 0.7	5	2 0.1	24	17 55.8
Aug. 1	5 33.9	19	23 12.6	8	15 6.5	28	7 7.7
4	18 52.7	23	12 23.4	12	4 13.0	31	20 20.2
8	8 12.0	27	1 34.0	15	17 19.5		

### SATELLITE III.

Jan. 7	<sup>h</sup> 6 <sup>m</sup> 29.9	May 16	<sup>h</sup> 14 <sup>m</sup> 27.1	Aug. 3	<sup>h</sup> 14 <sup>m</sup> 2.3	Oct. 21	<sup>h</sup> 6 <sup>m</sup> 22.6
14	10 40.9	23	18 56.6	10	18 4.2	28	9 39.3
21	14 55.2	30	23 24.5	17	22 2.1	Nov. 4	12 54.9
28	19 12.5	June 7	3 51.2	25	1 55.9	11	16 9.7
Feb. 4	23 32.8	14	8 15.7	Sept. 1	5 45.7	18	19 25.3
12	3 56.1	21	12 38.3	8	9 30.7	25	22 42.7
19	8 21.3	28	16 58.8	15	13 10.7	Dec. 3	2 3.4
26	12 48.7	July 5	21 17.1	22	16 45.2	10	5 28.2
March 5	17 17.1	13	1 33.4	29	20 15.3	17	8 56.9
12	21 46.4	20	5 46.4	Oct. 6	23 41.0	24	12 30.4
20	2 16.6	27	9 56.5	14	3 3.1	31	16 8.6

In the following Tables  $x$  and  $y$  are the rectangular coördinates for each Satellite, referred to the centre of the primary and the major and minor axis of the apparent ellipse described by the Satellite.  $x$  is positive on the *east* side of the planet; negative on the *west* side.  $y$  is positive when *north*; negative when *south*.

$x'$  and  $y'$  are the coördinates which correspond to a constant value of the major axis and maximum value of the minor axis, as seen from the sun at its mean distance.

The factors by which  $x'$  and  $y'$  must be multiplied to obtain the coördinates  $x$  and  $y$  at any time, are given for each Satellite on pages 489-490.

$p$  is the inclination of the minor axis of the apparent ellipse to the circle of declination; reckoned from the North, + towards the East.

# JUPITER'S SATELLITES, 1869. 485

COORDINATES IN THE MEAN APPARENT ELLIPSE, DESCRIBED BY THE  
SATELLITE, AND FOR THE MEAN DISTANCE OF JUPITER  
FROM THE SUN, FOR THE TIME ( $t$ ) AFTER GEO-  
CENTRIC SUPERIOR CONJUNCTION.

## SATELLITE I.

$t$	$x'$	$y'$	$t$	$x'$	$y'$	$t$	$x'$	$y'$
d h m			d h m			d h m		
0 0 0	+ 0.0	+ 6.6	0 15 0	+ 87.1	- 4.0	1 6 0	-105.1	- 1.8
0 0 20	5.4	6.6	0 15 20	83.7	4.3	1 6 20	106.4	1.5
0 0 40	10.8	6.6	0 15 40	80.1	4.5	1 6 40	107.5	1.2
0 1 0	16.1	6.6	0 16 0	76.4	4.7	1 7 0	108.3	0.8
0 1 20	21.4	6.5	0 16 20	72.5	5.0	1 7 20	108.8	0.5
0 1 40	26.6	6.4	0 16 40	68.4	5.2	1 7 40	109.1	- 0.2
0 2 0	+ 31.8	+ 6.3	0 17 0	+ 64.1	- 5.4	1 8 0	-109.1	+ 0.1
0 2 20	36.9	6.2	0 17 20	59.6	5.5	1 8 20	108.9	0.5
0 2 40	42.0	6.1	0 17 40	55.0	5.7	1 8 40	108.4	0.8
0 3 0	46.9	6.0	0 18 0	50.3	5.9	1 9 0	107.6	1.1
0 3 20	51.7	5.8	0 18 20	45.5	6.0	1 9 20	106.6	1.4
0 3 40	56.4	5.7	0 18 40	40.5	6.1	1 9 40	105.3	1.8
0 4 0	+ 60.9	+ 5.5	0 19 0	+ 35.5	- 6.3	1 10 0	-103.8	+ 2.1
0 4 20	65.3	5.3	0 19 20	30.4	6.4	1 10 20	102.0	2.4
0 4 40	69.5	5.1	0 19 40	25.2	6.4	1 10 40	99.9	2.7
0 5 0	73.6	4.9	0 20 0	19.9	6.5	1 11 0	97.6	3.0
0 5 20	77.5	4.7	0 20 20	14.6	6.6	1 11 20	95.1	3.3
0 5 40	81.2	4.4	0 20 40	9.2	6.6	1 11 40	92.3	3.5
0 6 0	+ 84.7	+ 4.2	0 21 0	+ 3.8	- 6.6	1 12 0	- 89.3	+ 3.8
0 6 20	88.0	3.9	0 21 20	- 1.5	6.6	1 12 20	86.1	4.1
0 6 40	91.0	3.7	0 21 40	6.9	6.6	1 12 40	82.7	4.3
0 7 0	94.0	3.4	0 22 0	12.3	6.6	1 13 0	79.1	4.6
0 7 20	96.6	3.1	0 22 20	17.6	6.5	1 13 20	75.3	4.8
0 7 40	99.0	2.8	0 22 40	22.9	6.5	1 13 40	71.3	5.0
0 8 0	+101.1	+ 2.5	0 23 0	- 28.1	- 6.4	1 14 0	- 67.1	+ 5.2
0 8 20	103.0	2.2	0 23 20	33.3	6.3	1 14 20	62.8	5.4
0 8 40	104.7	1.9	0 23 40	38.4	6.2	1 14 40	58.3	5.6
0 9 0	106.1	1.6	1 0 0	43.4	6.1	1 15 0	53.7	5.8
0 9 20	107.3	1.3	1 0 20	48.3	5.9	1 15 20	49.0	5.9
0 9 40	108.1	0.9	1 0 40	53.1	5.8	1 15 40	44.1	6.1
0 10 0	+108.7	+ 0.6	1 1 0	- 57.7	- 5.6	1 16 0	- 39.1	+ 6.2
0 10 20	109.1	+ 0.3	1 1 20	62.2	5.4	1 16 20	34.0	6.3
0 10 40	109.1	- 0.1	1 1 40	66.6	5.2	1 16 40	28.9	6.4
0 11 0	109.0	0.4	1 2 0	70.8	5.0	1 17 0	23.7	6.5
0 11 20	108.6	0.7	1 2 20	74.8	4.8	1 17 20	18.4	6.5
0 11 40	107.9	1.0	1 2 40	78.6	4.6	1 17 40	13.0	6.6
0 12 0	+106.9	- 1.3	1 3 0	- 82.2	- 4.4	1 18 0	- 7.7	+ 6.6
0 12 20	105.7	1.7	1 3 20	85.6	4.1	1 18 20	- 2.3	6.6
0 12 40	104.2	2.0	1 3 40	88.9	3.8	1 18 40	+ 3.1	6.6
0 13 0	102.5	2.3	1 4 0	91.9	3.6	1 19 0	8.5	6.6
0 13 20	100.5	2.6	1 4 20	94.7	3.3	1 19 20	13.8	6.6
0 13 40	98.3	2.9	1 4 40	97.3	3.0	1 19 40	19.1	6.5
0 14 0	+ 95.8	- 3.2	1 5 0	- 99.6	- 2.7	1 20 0	+ 24.4	+ 6.5
0 14 20	93.1	3.5	1 5 20	101.7	2.4			
0 14 40	+ 90.2	- 3.7	1 5 40	-103.5	- 2.1			

# 486 JUPITER'S SATELLITES, 1869.

## COORDINATES IN THE MEAN APPARENT ELLIPSE.

### SATELLITE II.

<i>t</i>	<i>x'</i>	<i>y'</i>	<i>t</i>	<i>x'</i>	<i>y'</i>	<i>t</i>	<i>x'</i>	<i>y'</i>
d h m	° ' "	° ' "	d h m	° ' "	° ' "	d h m	° ' "	° ' "
0 0 0	+ 0.0	+12.2	1 6 0	+139.5	- 7.3	2 12 0	-166.4	- 4.5
0 0 40	8.5	12.2	1 6 40	134.2	7.7	2 12 40	163.6	2.9
0 1 20	17.0	12.1	1 7 20	128.6	8.2	2 13 20	170.4	2.3
0 2 0	25.5	12.1	1 8 0	122.7	8.6	2 14 0	171.9	1.8
0 2 40	33.9	12.0	1 8 40	116.5	9.0	2 14 40	173.0	1.2
0 3 20	42.2	11.8	1 9 20	110.1	9.4	2 15 20	173.6	- 0.6
0 4 0	+ 50.5	+11.7	1 10 0	+103.4	- 9.8	2 16 0	-173.8	0.0
0 4 40	58.6	11.5	1 10 40	96.4	10.1	2 16 40	173.6	+ 0.6
0 5 20	66.5	11.3	1 11 20	89.2	10.5	2 17 20	172.9	1.2
0 6 0	74.3	11.0	1 12 0	81.7	10.8	2 18 0	171.8	1.8
0 6 40	81.9	10.8	1 12 40	74.1	11.0	2 18 40	170.3	2.4
0 7 20	89.4	10.5	1 13 20	66.3	11.3	2 19 20	168.4	3.0
0 8 0	+ 96.6	+10.1	1 14 0	+ 58.3	-11.5	2 20 0	-166.2	+ 3.5
0 8 40	103.6	9.8	1 14 40	50.2	11.7	2 20 40	163.5	4.1
0 9 20	110.3	9.4	1 15 20	42.0	11.8	2 21 20	160.4	4.7
0 10 0	116.7	9.0	1 16 0	33.7	12.0	2 22 0	156.9	5.2
0 10 40	122.9	8.6	1 16 40	25.3	12.1	2 22 40	153.0	5.8
0 11 20	128.8	8.2	1 17 20	16.8	12.1	2 23 20	148.8	6.3
0 12 0	+134.4	+ 7.7	1 18 0	+ 8.3	-12.2	3 0 0	-144.2	+ 6.8
0 12 40	139.6	7.3	1 18 40	- 0.2	12.2	3 0 40	139.3	7.3
0 13 20	144.5	6.8	1 19 20	8.8	12.2	3 1 20	134.1	7.8
0 14 0	149.0	6.3	1 20 0	17.3	12.1	3 2 0	128.5	8.2
0 14 40	153.2	5.7	1 20 40	25.7	12.1	3 2 40	122.6	8.6
0 15 20	157.0	5.2	1 21 20	34.1	12.0	3 3 20	116.4	9.0
0 16 0	+160.5	+ 4.7	1 22 0	- 42.4	-11.8	3 4 0	-109.9	+ 9.4
0 16 40	163.6	4.1	1 22 40	50.6	11.7	3 4 40	103.1	9.8
0 17 20	166.3	3.5	1 23 20	58.7	11.5	3 5 20	96.1	10.1
0 18 0	168.6	3.0	2 0 0	66.7	11.3	3 6 0	88.9	10.5
0 18 40	170.5	2.4	2 0 40	74.5	11.0	3 6 40	81.5	10.8
0 19 20	171.9	1.8	2 1 20	82.1	10.7	3 7 20	73.9	11.0
0 20 0	+172.9	+ 1.2	2 2 0	- 89.5	-10.4	3 8 0	- 66.1	+11.3
0 20 40	173.6	+ 0.6	2 2 40	96.7	10.1	3 8 40	58.1	11.5
0 21 20	173.8	0.0	2 3 20	103.7	9.8	3 9 20	50.0	11.7
0 22 0	173.6	- 0.6	2 4 0	110.4	9.4	3 10 0	41.8	11.8
0 22 40	172.9	1.2	2 4 40	116.8	9.0	3 10 40	33.5	12.0
0 23 20	171.8	1.8	2 5 20	123.0	8.6	3 11 20	25.1	12.1
1 0 0	+170.4	- 2.4	2 6 0	-128.9	- 8.2	3 12 0	- 16.6	+12.1
1 0 40	168.5	3.0	2 6 40	134.5	7.7	3 12 40	- 8.1	12.2
1 1 20	166.2	3.5	2 7 20	139.7	7.2	3 13 20	+ 0.4	12.2
1 2 0	163.5	4.1	2 8 0	144.6	6.7	3 14 0	9.0	12.2
1 2 40	160.4	4.7	2 8 40	149.1	6.2	3 14 40	17.5	12.1
1 3 20	157.0	5.2	2 9 20	153.3	5.7	3 15 20	26.0	12.1
1 4 0	+153.2	- 5.8	2 10 0	-157.1	- 5.2	3 16 0	+ 34.4	+12.0
1 4 40	149.0	6.3	2 10 40	160.6	4.6			
1 5 20	+144.4	- 6.8	2 11 20	-163.7	- 4.1			



# JUPITER'S SATELLITES, 1869. 487

COORDINATES IN THE MEAN APPARENT ELLIPSE.

## SATELLITE III.

<i>t</i>	<i>x'</i>	<i>y'</i>	<i>t</i>	<i>x'</i>	<i>y'</i>	<i>t</i>	<i>x'</i>	<i>y'</i>
d h m			d h m			d h m		
0 0 0	+ 0.0	+17.4	2 12 0	+225.4	-10.1	5 0 0	-262.3	- 5.6
0 1 20	13.5	17.4	2 13 20	217.3	10.8	5 1 20	266.4	4.8
0 2 40	26.9	17.3	2 14 40	208.6	11.5	5 2 40	269.8	4.0
0 4 0	40.3	17.2	2 16 0	199.5	12.1	5 4 0	272.6	3.2
0 5 20	53.6	17.1	2 17 20	189.9	12.7	5 5 20	274.7	2.3
0 6 40	66.8	16.9	2 18 40	179.9	13.3	5 6 40	276.2	1.5
0 8 0	+ 79.8	+16.7	2 20 0	+169.4	-13.8	5 8 0	-277.0	- 0.6
0 9 20	92.7	16.4	2 21 20	158.5	14.3	5 9 20	277.2	+ 0.2
0 10 40	105.3	16.1	2 22 40	147.2	14.8	5 10 40	276.7	1.1
0 12 0	117.6	15.8	3 0 0	135.6	15.2	5 12 0	275.5	1.9
0 13 20	129.7	15.4	3 1 20	123.7	15.6	5 13 20	273.7	2.7
0 14 40	141.5	15.0	3 2 40	111.5	16.0	5 14 40	271.2	3.6
0 16 0	+153.0	+14.5	3 4 0	+ 99.0	-16.3	5 16 0	-268.1	+ 4.4
0 17 20	164.1	14.0	3 5 20	86.3	16.6	5 17 20	264.4	5.2
0 18 40	174.7	13.5	3 6 40	73.3	16.8	5 18 40	260.1	6.0
0 20 0	184.9	13.0	3 8 0	60.2	17.0	5 20 0	255.1	6.8
0 21 20	194.7	12.4	3 9 20	47.0	17.2	5 21 20	249.5	7.6
0 22 40	204.1	11.8	3 10 40	33.6	17.3	5 22 40	243.3	8.3
1 0 0	+213.0	+11.1	3 12 0	+ 20.2	-17.4	6 0 0	-236.6	+ 9.1
1 1 20	221.4	10.5	3 13 20	+ 6.7	17.4	6 1 20	229.3	9.8
1 2 40	229.3	9.8	3 14 40	- 6.8	17.4	6 2 40	221.4	10.5
1 4 0	236.6	9.1	3 16 0	20.3	17.4	6 4 0	213.0	11.1
1 5 20	243.3	8.3	3 17 20	33.7	17.3	6 5 20	204.1	11.8
1 6 40	249.5	7.6	3 18 40	47.1	17.2	6 6 40	194.7	12.4
1 8 0	+255.1	+ 6.8	3 20 0	- 60.3	-17.0	6 8 0	-184.9	+13.0
1 9 20	260.0	6.0	3 21 20	73.4	16.8	6 9 20	174.7	13.5
1 10 40	264.3	5.2	3 22 40	86.3	16.6	6 10 40	164.1	14.0
1 12 0	268.0	4.4	4 0 0	99.0	16.3	6 12 0	153.0	14.5
1 13 20	271.1	3.6	4 1 20	111.5	16.0	6 13 20	141.5	15.0
1 14 40	273.6	2.7	4 2 40	123.7	15.6	6 14 40	129.7	15.4
1 16 0	+275.5	+ 1.9	4 4 0	-135.7	-15.2	6 16 0	-117.6	+15.8
1 17 20	276.7	1.1	4 5 20	147.2	14.8	6 17 20	105.2	16.1
1 18 40	277.2	+ 0.2	4 6 40	158.4	14.3	6 18 40	92.6	16.4
1 20 0	277.0	- 0.6	4 8 0	169.3	13.8	6 20 0	79.8	16.7
1 21 20	276.2	1.5	4 9 20	179.8	13.3	6 21 20	66.8	16.9
1 22 40	274.7	2.3	4 10 40	189.9	12.7	6 22 40	53.6	17.1
2 0 0	+272.6	- 3.2	4 12 0	-199.5	-12.1	7 0 0	- 40.3	+17.2
2 1 20	269.8	4.0	4 13 20	208.6	11.5	7 1 20	26.9	17.3
2 2 40	266.4	4.8	4 14 40	217.3	10.8	7 2 40	- 13.4	17.4
2 4 0	262.3	5.6	4 16 0	225.5	10.1	7 4 0	+ 0.1	17.4
2 5 20	257.6	6.4	4 17 20	233.1	9.4	7 5 20	13.6	17.4
2 6 40	252.3	7.2	4 18 40	240.1	8.7	7 6 40	27.0	17.3
2 8 0	+246.4	- 8.0	4 20 0	-246.5	- 8.0	7 8 0	+ 40.4	+17.2
2 9 20	240.0	8.7	4 21 20	252.3	7.2			
2 10 40	+233.0	- 9.4	4 22 40	-257.6	- 6.4			

# 488 JUPITER'S SATELLITES, 1869.

COORDINATES IN THE MEAN APPARENT ELLIPSE.								
SATELLITE IV.								
<i>t</i>	<i>x'</i>	<i>y'</i>	<i>t</i>	<i>x'</i>	<i>y'</i>	<i>t</i>	<i>x'</i>	<i>y'</i>
<sup>d</sup> <sup>h</sup>			<sup>d</sup> <sup>h</sup>			<sup>d</sup> <sup>h</sup>		
0 0	+ 0.0	+34.8	5 18	+406.2	-19.3	11 12	-449.0	-13.5
0 3	22.8	34.8	5 21	393.1	20.6	11 15	457.4	12.0
0 6	45.6	34.7	6 0	379.2	21.9	11 18	464.8	10.5
0 9	68.3	34.5	6 3	364.4	23.1	11 21	471.2	8.9
0 12	90.9	34.2	6 6	348.8	24.3	12 0	476.5	7.3
0 15	113.2	33.9	6 9	332.5	25.5	12 3	480.8	5.7
0 18	+135.3	+33.5	6 12	+315.4	-26.6	12 6	-484.0	- 4.1
0 21	157.1	33.0	6 15	297.6	27.6	12 9	486.2	2.5
1 0	178.5	32.4	6 18	279.2	28.5	12 12	487.3	- 0.8
1 3	199.6	31.8	6 21	260.2	29.4	12 15	487.3	+ 0.8
1 6	220.3	31.1	7 0	240.6	30.3	12 18	486.3	2.4
1 9	240.4	30.3	7 3	220.5	31.1	12 21	484.2	4.0
1 12	+260.0	+29.5	7 6	+199.9	-31.8	13 0	-480.9	+ 5.7
1 15	279.0	28.6	7 9	178.8	32.4	13 3	476.6	7.3
1 18	297.4	27.6	7 12	157.4	33.0	13 6	471.3	8.9
1 21	315.2	26.6	7 15	135.6	33.5	13 9	465.0	10.5
2 0	332.3	25.5	7 18	113.5	33.9	13 12	457.6	12.0
2 3	348.6	24.3	7 21	91.2	34.2	13 15	449.3	13.5
2 6	+364.1	+23.1	8 0	+ 68.7	-34.5	13 18	-440.0	+15.0
2 9	378.9	21.9	8 3	46.0	34.7	13 21	429.7	16.4
2 12	392.9	20.6	8 6	23.2	34.8	14 0	418.5	17.8
2 15	406.0	19.3	8 9	+ 0.3	34.8	14 3	406.3	19.2
2 18	418.2	17.9	8 12	- 22.5	34.8	14 6	393.2	20.6
2 21	429.5	16.5	8 15	45.3	34.7	14 9	379.3	21.9
3 0	+439.8	+15.0	8 18	- 68.0	-34.5	14 12	-364.6	+23.1
3 3	449.1	13.5	8 21	90.5	34.2	14 15	349.1	24.3
3 6	457.5	12.0	9 0	112.9	33.9	14 18	332.8	25.4
3 9	464.9	10.5	9 3	135.0	33.5	14 21	315.7	26.5
3 12	471.3	8.9	9 6	156.8	33.0	15 0	298.0	27.5
3 15	476.6	7.3	9 9	178.2	32.4	15 3	279.6	28.5
3 18	+480.8	+ 5.7	9 12	-199.3	-31.8	15 6	-260.5	+29.4
3 21	484.0	4.1	9 15	220.0	31.1	15 9	240.9	30.3
4 0	486.2	2.5	9 18	240.1	30.3	15 12	220.8	31.1
4 3	487.3	+ 0.8	9 21	259.7	29.5	15 15	200.2	31.8
4 6	487.3	- 0.8	10 0	278.7	28.6	15 18	179.2	32.4
4 9	486.3	2.4	10 3	297.2	27.6	15 21	157.7	33.0
4 12	+484.2	- 4.1	10 6	-315.0	-26.6	16 0	-135.9	+33.5
4 15	480.9	5.7	10 9	332.1	25.5	16 3	113.8	33.9
4 18	476.6	7.3	10 12	348.4	24.4	16 6	91.5	34.2
4 21	471.3	8.9	10 15	363.9	23.2	16 9	69.0	34.5
5 0	465.0	10.4	10 18	378.7	21.9	16 12	46.3	34.7
5 3	457.7	12.0	10 21	392.7	20.6	16 15	23.5	34.8
5 6	+449.3	-13.5	11 0	-405.8	-19.3	16 18	- 0.6	+34.8
5 9	439.9	15.0	11 3	418.0	17.9	16 21	+ 22.2	34.8
5 12	429.6	16.4	11 6	429.3	16.5	17 0	+ 45.0	+34.7
5 15	+418.4	-17.9	11 9	-439.6	-15.0			

# JUPITER'S SATELLITES, 1869. 489

## SATELLITE I.

Date, 1869.	AT GEOCENTRIC SUPERIOR CONJUNCTION.			AT TIME OF ECLIPSE.		Date, 1869.	AT GEOCENTRIC SUPERIOR CONJUNCTION.			AT TIME OF ECLIPSE.	
	Factor for z'.	Factor for y'.	P.	z.	y.		Factor for z'.	Factor for y'.	P.	z.	y.
Jan. 2	1.048	+0.716	-25° 10.4	+40	+4	Aug. 6	1.050	+0.974	-16° 21.4	-40	+6
10	1.025	0.702	25 6.6	39	4	14	1.074	1.004	16 7.5	40	6
17	1.004	0.689	25 2.0	37	4	21	1.098	1.034	15 56.6	41	6
24	0.984	0.677	24 56.6	36	4	28	1.122	1.065	15 48.7	41	7
31	0.966	0.668	24 50.5	35	4	Sept. 4	1.147	1.096	15 44.2	41	7
Feb. 7	0.949	+0.661	-24 43.3	+33	+4	11	1.172	+1.126	-15 43.2	-41	+7
14	0.934	0.657	24 35.0	31	4	18	1.196	1.156	15 46.1	41	7
21	0.921	0.654	24 25.3	29	4	25	1.220	1.185	15 51.8	40	8
28	0.909	0.653	24 13.7	27	4	Oct. 2	1.243	1.210	16 0.8	39	8
Mar. 7	0.899	0.653	24 0.0	25	4	9	1.264	1.229	16 13.3	37	8
14	0.891	+0.654	-23 43.9	+23	+4	16	1.280	+1.244	-16 28.1	-35	+8
May 21	0.888	0.737	20 31.8	-23	5	23	1.292	1.253	16 44.9	32	8
28	0.895	0.752	20 6.8	25	5	30	1.300	1.255	17 3.0	28	8
June 4	0.904	0.768	19 41.3	27	5	Nov. 6	1.302	1.250	17 21.7	-23	8
11	0.914	0.785	19 15.7	29	5	14	1.300	1.238	17 43.4	+25	8
18	0.926	+0.804	-18 50.5	-31	+5	21	1.292	+1.220	-17 57.7	+30	+8
25	0.939	0.824	18 25.7	33	5	28	1.280	1.195	18 13.7	33	8
July 2	0.954	0.846	18 1.5	35	5	Dec. 5	1.263	1.164	18 27.8	36	8
9	0.970	0.869	17 38.3	36	5	12	1.243	1.130	18 39.4	38	8
16	0.988	0.893	17 16.3	37	6	19	1.220	1.096	18 47.7	40	8
23	1.007	+0.919	-16 55.8	-39	+6	26	1.196	+1.063	-18 51.6	+41	+8
30	1.028	+0.946	-16 37.5	-40	+6						

## SATELLITE II.

Date, 1869.	AT GEOCENTRIC SUPERIOR CONJUNCTION.			AT TIME OF ECLIPSE.		Date, 1869.	AT GEOCENTRIC SUPERIOR CONJUNCTION.			AT TIME OF ECLIPSE.	
	Factor for z'.	Factor for y'.	P.	z. D. R.	y.		Factor for z'.	Factor for y'.	P.	z. D. R.	y.
Jan. 3	1.045	+0.729	-25° 15.3	+20	+5	Aug. 9	1.056	+0.937	-16° 0.8	-52	+11
11	1.022	0.714	25 11.3	19 49	8	16	1.081	0.965	15 47.5	54 23	11
18	1.001	0.700	25 6.3	17 47	8	23	1.105	0.993	15 37.2	54 23	12
25	0.981	0.688	25 0.3	+16 45	8	30	1.130	1.021	15 30.2	54 22	12
Feb. 1	0.963	0.678	24 53.1	43	8	Sept. 6	1.155	1.049	15 26.7	54 21	13
8	0.947	+0.671	-24 44.7	+41	+8	13	1.181	+1.077	-15 26.7	-53 -19	+13
15	0.932	0.666	24 35.1	38	8	20	1.205	1.104	15 30.2	51	13
22	0.920	0.663	24 24.1	35	8	27	1.228	1.130	15 37.2	48	13
Mar. 1	0.908	0.662	24 11.6	32	8	Oct. 4	1.250	1.153	15 47.5	44	14
8	0.898	0.662	23 57.6	29	8	11	1.270	1.170	16 1.0	40	14
16	0.890	+0.662	-23 42.1	+26	+8	19	1.285	+1.183	-16 16.8	-36	+14
May 22	0.889	0.728	20 16.2	-27	9	26	1.295	1.191	16 34.5	31	14
29	0.896	0.741	19 50.1	30	9	Nov. 2	1.300	1.192	16 53.3	-24	14
June 6	0.906	0.755	19 23.7	32	9	9	1.302	1.187	17 12.2	+17	14
13	0.916	0.770	18 57.4	35	9	16	1.298	1.175	17 30.6	25	14
20	0.929	+0.789	-18 31.5	-38	+9	23	1.289	+1.158	-17 48.0	+31	+14
27	0.942	0.804	18 6.1	41	10	30	1.276	1.135	18 3.8	36	13
July 4	0.958	0.823	17 41.3	43 -16	10	Dec. 7	1.257	1.108	18 17.2	41	13
11	0.974	0.843	17 17.8	46 18	10	14	1.236	1.076	18 27.8	45	13
18	0.993	0.865	16 55.6	48 19	10	21	1.212	1.044	18 35.5	48	12
25	1.012	+0.889	-16 35.2	-50 -21	+11	29	1.187	+1.011	-18 43.5	+50	+12
Aug. 1	1.034	+0.912	-16 16.8	-51 -22	+11						

# 490 JUPITER'S SATELLITES, 1869.

SATELLITE III.							
Date, 1869.	AT GEOCENTRIC SUPERIOR CONJUNCTION.			AT TIME OF ECLIPSE.			
	Factor for $x'$ .	Factor for $y'$ .	$p$ .	Disappearance.		Reappearance.	
				$x$ .	$y$ .	$x$ .	$y$ .
Jan. 7	1.032	+0.622	-25 13.5	+43	+11	+68	+11
15	1.010	0.609	25 9.7	41	10	65	10
22	0.989	0.599	25 4.9	38	10	62	10
29	0.970	0.591	24 59.1	35	10	58	10
Feb. 5	0.952	0.586	24 52.2	32	10	54	10
12	0.937	+0.583	-24 44.0	+28	+10	+50	+10
20	0.923	0.582	24 34.4	24	10	45	10
27	0.912	0.582	24 23.4	20	10	41	10
March 6	0.901	0.583	24 11.1	+16	10	36	10
13	0.892	0.586	23 57.5			+31	10
May 24	0.891	+0.685	20 30.9	-32	+12	-14	+12
31	0.898	0.701	20 5.7	37	12	18	12
June 7	0.909	0.718	19 40.0	41	12	22	12
15	0.919	0.737	19 14.4	45	13	26	13
22	0.933	0.757	18 49.1	49	13	30	13
July 29	0.946	+0.778	-18 24.3	-53	+13	-34	+13
6	0.963	0.800	18 0.5	56	14	38	14
13	0.980	0.824	17 37.9	60	14	41	14
20	1.000	0.849	17 16.6	63	15	44	15
28	1.019	0.876	16 57.0	66	15	47	15
Aug. 4	1.042	+0.904	-16 39.8	-68	+16	-49	+16
11	1.064	0.933	16 25.0	70	16	50	16
18	1.090	0.962	16 13.0	71	17	51	17
25	1.114	0.992	16 4.0	71	17	51	17
Sept. 1	1.140	1.023	15 58.4	71	18	50	18
9	1.165	+1.053	-15 56.3	-69	+18	-48	+18
16	1.192	1.081	15 57.7	67	19	45	19
23	1.215	1.108	16 2.7	63	19	41	19
30	1.237	1.132	16 11.0	58	19	36	19
Oct. 7	1.258	1.152	16 22.5	52	20	29	20
14	1.277	+1.166	-16 36.9	-44	+20	-21	+20
21	1.290	1.176	16 53.3	35	20	-12	20
29	1.298	1.179	17 11.2	26	20		
Nov. 5	1.300	1.174	17 29.8	-16	20		
12	1.300	1.162	17 48.5			+18	20
19	1.294	+1.144	-18 6.5			+28	+20
26	1.283	1.120	18 22.9	+14	+19	37	19
Dec. 3	1.268	1.090	18 37.0	23	19	45	19
10	1.247	1.055	18 49.6	30	18	52	18
17	1.225	1.017	18 59.3	36	18	58	18
24	1.200	+0.984	-19 5.3	+41	+17	+62	+17
31	1.174	+0.959	-19 8.7	+45	+17	+65	+17

## THE APPARENT ELEMENTS OF SATURN'S RING.

Washington Mean Noon.	$\alpha$ Outer Major Axis.	$b$ Outer Minor Axis.	$p$ Inclination of Northern Semi-minor Axis to Circle of Declination from North to East.	$l$ The Elevation of the Earth above the Plane of the Ring.	$l'$ The Elevation of the Sun above the Plane of the Ring.	$u$ $u'$ Earth's Longitude from Saturn counted on Plane of Ring from the Ring's As- cending Node on	
						Equator.	Ecliptic.
Jan. 0	34.54	15.38	+4 29.8	+26 26.3	+26 7.5	306 27.6	263 24.1
20	35.20	15.71	4 44.6	26 31.0	26 11.4	308 43.4	265 40.1
Feb. 9	36.13	16.14	4 56.1	26 32.3	26 15.2	310 33.8	267 30.5
March 1	37.32	16.67	5 3.7	26 31.4	26 18.7	311 48.1	268 44.9
21	38.56	17.20	5 7.0	26 29.6	26 22.1	312 21.0	269 17.8
April 10	39.80	17.73	5 5.7	26 27.4	26 25.2	312 9.8	269 6.6
30	40.83	18.17	5 0.4	26 25.6	26 28.1	311 17.3	268 14.3
May 20	41.48	18.44	4 51.7	26 23.7	26 31.0	309 53.8	266 50.8
June 9	41.62	18.52	4 41.3	26 21.9	26 33.5	308 15.8	265 12.9
29	41.91	18.29	4 31.3	26 20.3	26 35.8	306 42.9	263 40.0
July 19	40.36	17.90	4 23.7	26 20.2	26 38.1	305 33.1	262 30.3
Aug. 8	39.21	17.42	4 20.0	26 22.4	26 40.0	304 59.2	261 56.5
28	37.94	16.90	4 21.0	26 27.2	26 41.9	305 7.5	262 4.8
Sept. 17	36.72	16.42	4 26.8	26 34.1	26 43.5	305 58.1	262 55.5
Oct. 7	35.65	16.02	4 36.6	26 42.0	26 44.9	307 27.1	264 24.5
27	34.82	15.71	4 49.6	26 49.1	26 46.2	309 27.4	266 24.9
Nov. 16	34.28	15.51	5 4.6	26 54.0	26 47.2	311 50.5	268 48.0
Dec. 6	34.04	15.42	5 20.3	26 55.6	26 48.1	314 26.1	271 23.7
26	34.13	15.44	5 35.5	26 53.5	26 48.7	317 4.5	274 2.2
31	34.20	15.46	+5 39.0	+26 52.4	+26 48.8	317 43.4	274 41.8

Factor which is to be multiplied by  $a$  and  $b$  to obtain the axes of

The inner ellipse of the outer Ring = 0.8801 log. Factor = 9.9445

The outer ellipse of the inner Ring = 0.8599 " = 9.9344

The inner ellipse of the inner Ring = 0.6650 " = 9.8228

The inner ellipse of Bond's dusky Ring = 0.5486 " = 9.7392

NOTE.—The sign of  $l$  indicates whether the visible surface of the Ring is northern or southern.

## THE APPARENT DISCS OF VENUS AND MARS.

The Versed Sines of their Illuminated Portions, divided by their Apparent Diameters.

1869.	Venus.	Mars.	1869.	Venus.	Mars.
January 15	0.886	0.964	July 15	0.948	0.907
February 15	0.938	0.999	August 15	0.891	0.924
March 15	0.972	0.962	September 15	0.818	0.943
April 15	0.994	0.913	October 15	0.734	0.959
May 15	0.999	0.897	November 15	0.628	0.974
June 15	0.984	0.895	December 15	0.495	0.986

## WASHINGTON MEAN TIME.

## PLANETARY CONSTELLATIONS.

	d	h	m				d	h	m		
Jan.	1	18	30	♂	♂	♂	25	22	52	♂	stationary.
	2	10	32	♂	♂	♂	26	18	4	♂	stationary.
	2	15	42	♂	♂	♂	30	0	17	♂	great. Hel. Lat. S.
	4	1	54	♂	♂	♂	April 1	0	40	♂	♂
	4	21	8	♂	♂	♂	2	9	26	♂	♂
	5	0	42	♂	♂	♂	6	1	45	♂	♂
	8	20	27	♂	♂	♂	9	15	6	♂	♂
	9	12	1	♂	♂	♂	10	14	10	♂	♂
	12	17	13	♂	♂	♂	10	20	25	♂	♂
	13	4	15	♂	♂	♂	11	3	29	♂	♂
Feb.	18	8	9	♂	♂	♂	11	13	26	♂	♂
	18	20	46	♂	♂	♂	13	6	0	♂	♂
	25	18	37	♂	♂	♂	16	13	20	♂	♂
	27	-	-	♂	♂	♂	17	18	26	♂	♂
	28	21	55	♂	♂	♂	18	4	32	♂	♂
	29	1	16	♂	♂	♂	20	8	2	♂	♂
	1	3	19	♂	♂	♂	22	8	9	♂	♂
	1	3	47	♂	♂	♂	24	1	0	♂	♂
	3	8	45	♂	♂	♂	26	2	33	♂	♂
	5	6	44	♂	♂	♂	28	8	46	♂	♂
Mar.	5	17	9	♂	♂	♂	28	20	16	♂	♂
	8	20	40	♂	♂	♂	30	2	34	♂	♂
	9	5	35	♂	♂	♂	4	16	24	♂	♂
	11	-	-	♂	♂	♂	8	5	19	♂	♂
	11	21	8	♂	♂	♂	8	15	16	♂	♂
	12	23	35	♂	♂	♂	9	9	23	♂	♂
	15	0	26	♂	♂	♂	10	21	47	♂	♂
	15	4	30	♂	♂	♂	12	2	48	♂	♂
	16	0	26	♂	♂	♂	14	23	43	♂	♂
	18	19	50	♂	♂	♂	15	1	29	♂	♂
June	22	3	50	♂	♂	♂	18	5	17	♂	♂
	24	17	38	♂	♂	♂	19	3	8	♂	♂
	26	10	58	♂	♂	♂	25	7	12	♂	♂
	27	13	32	♂	♂	♂	25	15	21	♂	♂
	3	1	29	♂	♂	♂	28	22	14	♂	♂
	4	11	57	♂	♂	♂	3	19	29	♂	♂
	4	15	54	♂	♂	♂	4	14	39	♂	♂
	6	15	48	♂	♂	♂	6	5	36	♂	♂
	7	13	48	♂	♂	♂	7	11	47	♂	♂
	10	4	35	♂	♂	♂	10	3	27	♂	♂
May	11	5	59	♂	♂	♂	10	20	25	♂	♂
	11	12	32	♂	♂	♂	11	5	40	♂	♂
	14	12	13	♂	♂	♂	11	10	23	♂	♂
	14	18	19	♂	♂	♂	15	7	50	♂	♂
	17	15	36	♂	♂	♂	16	21	12	♂	♂
	19	20	16	♂	♂	♂	17	16	1	♂	♂
	20	18	18	♂	♂	♂	20	16	50	♂	♂
	21	11	43	♂	♂	♂	21	20	6	♂	♂
	21	16	45	♂	♂	♂	24	4	34	♂	♂
	23	19	6	♂	♂	♂	24	19	52	♂	♂

## WASHINGTON MEAN TIME.

## PLANETARY CONSTELLATIONS.

	d	h	m						d	h	m				
June	27	22	40	♂	♀	in Perihelion.			Oct.	4	1	56	♂	♂	great. Hel. Lat. S.
July	1	23	42	♂	♂	♂ . . . . . ♀ + 3 33			5	17	24	♂	♂	♂ . . . . . ♀ - 0 38	
	3	3	8	♂	♂	♂ in Apogee.			6	5	14	♂	♂	♂ . . . . . ♀ - 9 2	
	4	0	52	♂	♂	♂ . . . . . ♀ + 4 19			7	11	1	♂	♂	♂ . . . . . ♀ - 5 39	
	5	13	20	♂	♂	♂ stationary.			7	12	33	♂	♂	♂ . . . . . ♀ - 6 20	
	7	13	24	♂	♂	♂ . . . . . ♀ - 0 56			7	21	30	♂	♂	♂ stationary.	
	8	2	33	♂	♂	♂ greatest Hel. Lat. S.			8	22	55	♂	♂	♂ . . . . . ♀ - 2 39	
	8	21	33	♂	♂	♂ . . . . . ♀ + 2 11			10	17	22	♂	♂	♂ . . . . . ♀ - 2 39	
	9	5	24	♂	♂	♂ . . . . . ♀ + 1 40			14	12	23	♂	♂	♂ . . . . . ♀ - 2 39	
	10	3	50	♂	♂	♂ . . . . . ♀ + 1 40			18	7	16	♂	♂	♂ in Aphelion.	
	11	4	49	♂	♂	♂ . . . . . ♀ - 3 45			18	23	37	♂	♂	♂ . . . . . ♀ + 3 19	
	13	14	31	♂	♂	♂ . . . . . ♀ - 3 45			19	15	46	♂	♂	♂ Inf.	
	16	4	57	♂	♂	♂ greatest elong. W. 20 24			21	12	26	♂	♂	♂ . . . . . ♀ + 3 41	
	18	23	44	♂	♂	♂ . . . . . ♀ - 2 50			23	1	7	♂	♂	♂ in ♄	
	19	18	54	♂	♂	♂ greatest Hel. Lat. N.			25	9	5	♂	♂	♂ . . . . . ♀ - 3 31	
	23	-	-	♂	♂	♂ Eclipsed, invis. at Wash.			26	16	29	♂	♂	♂ . . . . . ♀ + 1 23	
	23	4	-	♂	♂	♂ stationary.			27	14	57	♂	♂	♂ in Perihelion.	
	27	1	11	♂	♂	♂ . . . . . ♀ - 0 26			27	20	24	♂	♂	♂ stationary.	
	27	1	50	♂	♂	♂ in ♄			28	4	3	♂	♂	♂ stationary.	
	29	7	38	♂	♂	♂ . . . . . ♀ + 3 35	Nov.	1	21	10	♂	♂	♂ . . . . . ♀ - 3 2		
	31	15	40	♂	♂	♂ in Perihelion.			4	12	0	♂	♂	♂ greatest elong. W. 18 55	
Aug.	31	17	29	♂	♂	♂ . . . . . ♀ + 4 14			5	9	40	♂	♂	♂ . . . . . ♀ - 4 40	
	5	10	13	♂	♂	♂ . . . . . ♀ + 2 6			5	13	35	♂	♂	♂ . . . . . ♀ - 2 22	
	6	20	49	♂	♂	♂ . . . . . ♀ + 1 23			6	12	57	♂	♂	♂ . . . . . ♀ - 5 20	
	7	-	-	♂	♂	♂ Eclipsed, vis. at Wash.			6	22	19	♂	♂	♂ greatest Hel. Lat. N.	
	8	22	49	♂	♂	♂ . . . . . ♀ - 1 40			7	13	11	♂	♂	♂ . . . . . ♀ - 2 11	
	10	22	56	♂	♂	♂ greatest Hel. Lat. N.			8	21	41	♂	♂	♂ greatest Hel. Lat. S.	
	11	1	11	♂	♂	♂ . . . . . ♀ - 5 8			9	16	58	♂	♂	♂ . . . . . ♀ + 3 25	
	11	11	26	♂	♂	♂ Sup.			15	4	52	♂	♂	♂ . . . . . ♀ + 3 48	
	11	18	2	♂	♂	♂ . . . . . ♀ + 1 13			17	11	42	♂	♂	♂ . . . . . ♀ + 3 48	
	14	6	58	♂	♂	♂ stationary.			22	21	17	♂	♂	♂ . . . . . ♀ + 1 13	
	14	12	4	♂	♂	♂ in ♄			30	10	17	♂	♂	♂ in ♄	
	15	4	11	♂	♂	♂ . . . . . ♀ - 2 57	Dec.	2	5	25	♂	♂	♂ . . . . . ♀ - 4 29		
	25	13	59	♂	♂	♂ . . . . . ♀ + 3 30			3	5	35	♂	♂	♂ . . . . . ♀ - 2 7	
	28	5	29	♂	♂	♂ . . . . . ♀ + 4 2			4	10	52	♂	♂	♂ . . . . . ♀ - 3 6	
Sept.	1	22	45	♂	♂	♂ . . . . . ♀ + 1 56			6	12	4	♂	♂	♂ . . . . . ♀ - 2 15	
	2	15	34	♂	♂	♂ in ♄			10	14	36	♂	♂	♂ in Aphelion.	
	3	11	2	♂	♂	♂ . . . . . ♀ - 5 8			10	20	8	♂	♂	♂ . . . . . ♀ - 2 26	
	6	20	26	♂	♂	♂ . . . . . ♀ - 4 53			11	19	5	♂	♂	♂ . . . . . ♀ - 2 26	
	7	16	13	♂	♂	♂ . . . . . ♀ - 4 53			12	11	31	♂	♂	♂ . . . . . ♀ + 3 37	
	8	16	2	♂	♂	♂ . . . . . ♀ - 5 48			12	23	52	♂	♂	♂ Sup.	
	9	3	54	♂	♂	♂ stationary.			13	3	2	♂	♂	♂ greatest elong. E. 47 19	
	11	11	34	♂	♂	♂ . . . . . ♀ - 2 54			14	13	34	♂	♂	♂ . . . . . ♀ + 4 5	
	13	15	18	♂	♂	♂ in Aphelion.			20	1	58	♂	♂	♂ . . . . . ♀ + 1 11	
	13	20	29	♂	♂	♂ in ♄			21	1	8	♂	♂	♂ enters ♄, winter com.	
	21	19	1	♂	♂	♂ . . . . . ♀ + 3 22			27	22	-	♂	♂	♂ stationary.	
	22	7	12	♂	♂	♂ enters ♄, autumn com.			30	20	35	♂	♂	♂ . . . . . ♀ - 1 56	
	24	11	31	♂	♂	♂ . . . . . ♀ + 3 47			31	0	52	♂	♂	♂ in Perigee.	
	25	5	39	♂	♂	♂ greatest elong. E. 26 4			31	1	9	♂	♂	♂ greatest Hel. Lat. S.	
	29	9	18	♂	♂	♂ . . . . . ♀ + 1 41									

## POSITIONS OF THE PRINCIPAL OBSERVATORIES.

*(North Latitudes and West Longitudes are considered as positive.)*

Place.	Latitude.	Longitude from Washington in Time.	Longitude from Washington in Arc.	Longitude from Greenwich in Arc.
Åbo, . . . . .	+60° 26' 56.8	— 6 <sup>h</sup> 37 <sup>m</sup> 20.0 <sup>s</sup>	260° 40' 0.6	337° 42' 48.6
Albany, . . . . .	+42 39 50.0	— 0 13 12.6	356 41 51.0	73 44 39.0
Altona, . . . . .	+53 32 45.3	— 5 47 57.4	273 0 39.8	350 3 27.8
Ann Arbor, . . . . .	+42 16 48.0	+ 0 26 41.0	6 40 15.0	83 43 3.0
Athens, . . . . .	+37 58 20.0	— 6 43 6.4	259 13 24.2	336 16 12.2
Berlin, . . . . .	+52 30 16.7	— 6 1 46.1	269 33 28.1	346 36 16.1
Bilk, . . . . .	+51 12 25.0	— 5 35 16.1	276 10 58.1	353 13 46.1
Bonn, . . . . .	+50 43 45.0	— 5 36 35.7	275 51 5.1	352 53 53.1
Breslau, . . . . .	+51 6 56.0	— 6 16 21.2	265 54 42.0	342 57 30.0
Brussels, . . . . .	+50 51 10.7	— 5 25 38.8	278 35 18.0	355 38 6.0
Cambridge, (Eng.),	+52 12 51.8	— 5 8 34.7	282 51 18.9	359 54 6.9
Cambridge, (Mass.),	+42 22 48.6	— 0 23 41.5	354 4 36.9	71 7 24.9
Cape of Good Hope,	—33 56 3.0	— 6 22 7.2	264 28 12.3	341 31 0.3
Chicago, . . . . .	+41 50 1.0	+ 0 42 14.3	10 33 34.5	87 36 22.5
Christiania, . . . . .	+59 54 43.7	— 5 51 6.0	272 13 30.6	349 16 18.6
Cincinnati, . . . . .	+39 5 54.0	+ 0 29 46.9	7 26 42.8	84 29 30.8
Copenhagen, . . . . .	+55 40 53.0	— 5 58 30.5	270 22 22.5	347 25 10.5
Cracow, . . . . .	+50 3 50.0	— 6 28 2.4	262 59 23.4	340 2 11.4
Dorpat, . . . . .	+58 22 47.1	— 6 55 5.8	256 13 33.6	333 16 21.6
Dublin, . . . . .	+53 23 13.0	— 4 42 49.2	289 17 42.0	6 20 30.0
Durham, . . . . .	+54 46 6.4	— 5 1 53.2	284 31 42.0	1 34 30.0
Edinburgh, . . . . .	+55 57 23.2	— 4 55 28.2	286 7 57.0	3 10 45.0
Florence, . . . . .	+43 46 40.8	— 5 53 12.9	271 41 47.1	348 44 35.1
Geneva, . . . . .	+46 11 58.8	— 5 32 48.9	276 47 46.8	353 50 34.8
Georgetown, . . . . .	+38 54 26.1	+ 0 0 6.2	0 1 33.0	77 4 21.0
Göttingen, . . . . .	+51 31 47.9	— 5 47 57.3	273 0 40.5	350 3 28.5
Gotha, . . . . .	+50 56 5.2	— 5 51 6.9	272 13 17.1	349 16 5.1
Greenwich, . . . . .	+51 28 38.2	— 5 8 11.2	282 57 12.0	0 0 0.0
Hamburg, . . . . .	+53 33 7.0	— 5 48 4.8	272 58 48.6	350 1 36.6
Hudson, . . . . .	+41 14 42.6	+ 0 17 32.1	4 23 0.9	81 25 48.9
Kasan, . . . . .	+55 47 23.1	— 8 24 43.1	233 49 13.1	310 52 1.1
Königsberg, . . . . .	+54 42 50.4	— 6 30 11.6	262 27 6.6	339 29 54.6
Kremsmünster, . . . . .	+48 3 23.8	— 6 4 44.6	268 48 50.7	345 51 38.7
Leipsic, . . . . .	+51 20 20.7	— 5 57 39.7	270 35 4.5	347 37 52.5
Leyden, . . . . .	+52 9 28.2	— 5 26 8.6	278 27 50.6	355 30 38.6
Liverpool, . . . . .	+53 24 47.4	— 4 56 11.1	285 57 13.7	3 0 1.7
London, . . . . .	+51 31 29.8	— 5 7 34.1	283 6 28.5	0 9 16.5
Madras, . . . . .	+13 4 9.2	—10 29 8.2	202 42 57.0	279 45 45.0
Mannheim, . . . . .	+49 29 12.9	— 5 42 2.7	274 29 19.5	351 32 7.5
Markree, . . . . .	+54 10 31.7	— 4 34 22.8	291 24 18.0	8 27 6.0
Marseilles, . . . . .	+43 17 49.0	— 5 29 40.2	277 34 57.2	354 37 45.2
Milan, . . . . .	+45 28 0.7	— 5 44 57.8	273 45 32.4	350 48 20.4
Modena, . . . . .	+44 38 52.8	— 5 51 55.2	272 1 12.5	349 4 0.5



Place.	Latitude.	Longitude from Washington in Time.	Longitude from Washington in Arc.	Longitude from Greenwich in Arc.
Moscow, . . . .	+55° 45' 19.8	— 7 <sup>h</sup> 38 <sup>m</sup> 28.1 <sup>s</sup>	245° 22' 58.5	322° 25' 46.5
Munich, . . . .	+48 8 45.0	— 5 54 37.6	271 20 35.4	348 23 23.4
Naples, . . . .	+40 51 46.6	— 6 5 12.1	268 41 58.1	345 44 46.1
Olmütz, . . . .	+49 35 40.0	— 6 17 11.3	265 42 10.5	342 44 58.5
Oxford, . . . .	+51 45 36.0	— 5 3 8.6	284 12 51.0	1 15 39.0
Padua, . . . .	+45 24 2.5	— 5 55 40.2	271 4 56.6	348 7 44.6
Palermo, . . . .	+38 6 44.0	— 6 1 36.7	269 35 50.1	346 38 38.1
Paramatta, . . . .	—33 48 49.8	+ 8 47 42.6	131 55 38.3	208 58 26.3
Paris, . . . .	+48 50 13.2	— 5 17 32.7	280 36 50.1	357 39 38.1
St. Petersburg, . .	+59 56 29.7	— 7 9 24.7	252 38 49.8	329 41 37.8
Philadelphia, . . .	+39 57 7.5	— 0 7 33.6	358 6 35.4	75 9 23.4
Prague, . . . .	+50 5 18.5	— 6 5 53.2	268 31 42.6	345 34 30.6
Pulkowa, . . . .	+59 46 18.7	— 7 9 29.9	252 37 31.9	329 40 19.9
Rome, . . . .	+41 53 54.0	— 5 58 5.9	270 28 31.5	347 31 19.5
San Fernando, . .	+36 27 45.0	— 4 43 22.1	289 9 29.1	6 12 17.1
Santiago, . . . .	—33 26 24.8	— 0 25 52.3	353 31 55.5	70 34 43.5
Senftenberg, . . .	+50 5 10.1	— 6 14 1.1	266 29 43.1	343 32 31.1
Upsala, . . . .	+59 51 31.5	— 6 18 42.4	265 19 24.0	342 22 12.0
Vienna, . . . .	+48 12 35.5	— 6 13 43.7	266 34 4.1	343 36 52.1
Washington, . . .	+38 53 39.3	0 0 0.0	0 0 0.0	77 2 48.0
Wilna, . . . .	+54 40 59.1	— 6 49 23.0	257 39 15.5	334 42 3.5

## ON THE ARRANGEMENT AND USE OF THE TABLES IN THIS EPHEMERIS.

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THIS Ephemeris is divided into two distinct parts. One part is designed for the special use of NAVIGATORS, and is adapted to the Meridian of Greenwich.

The other part is suited to the convenience of ASTRONOMERS, on this continent particularly, and is adapted to the Meridian of Washington.

### THE NAUTICAL PART.

This part contains the Ephemeris of the Sun and Moon; the distances of the Moon from the centres of the Sun and the four most conspicuous Planets, and from certain Fixed Stars; the Ephemeris of the Planets Venus, Mars, Jupiter, and Saturn; and the Mean Places of 198 principal Fixed Stars for the beginning of the year 1869.

*Time.*—Astronomers make use of several different kinds of time; an explanation of the nature of which, and of the method of passing from one to another, properly precedes an explanation of the uses of the Ephemeris.

*Sidereal Time.*—Sidereal Time is measured by the daily motion of the stars, or, as it is used by astronomers, by the daily motion of that point in the equator from which the true right ascensions of the stars are counted. This point is the vernal equinox, and its hour angle is called the *Sidereal Time*. Astronomical clocks are regulated to sidereal time.

A *Sidereal Day* is the interval of time between the transit of the vernal equinox over any meridian, and its next succeeding return to the same meridian. It is divided into 24 hours. The sidereal hours are counted from 0 to 24, commencing with the instant of the passage of the true vernal equinox over the upper meridian, and ending with its return to the same meridian.

The vernal equinox is not a fixed, but a movable, point on the equator. Its motion is composed of two parts: precession, which is proportional to the time, and is combined with the daily motion of the heavens; and nutation, which is periodical. In consequence of the latter, the daily motion of the equinox is not strictly a uniform measure of time, and the Sidereal Time in common use might therefore be called *Apparent Sidereal Time*; and *Mean Sidereal Time* would be that reckoned from the transit of the mean equinox; but the irregularity referred to cannot exceed  $2^s.3$  in a period of nineteen years, and is, therefore, of no practical importance.

*Solar Time.*—Solar Time is measured by the daily motion of the sun. A *Solar Day* is the interval of time between two successive transits of the sun over the same meridian; and the hour angle of the sun is called *Solar Time*. This is the most natural and direct measure of time. But the intervals between the successive returns of the sun to the meridian are not exactly equal, but depend upon the variable motion of the sun in right ascension.

The want of uniformity in the sun's motion in right ascension arises from two different causes; one, that the sun does not move in the equator, but in the ecliptic; the other, that the sun's motion in the ecliptic is not uniform.

To avoid the irregularity in time caused by the want of uniformity in the sun's motion, a fictitious sun, called a *Mean Sun*, is supposed to move in the equator with a uniform velocity

*Mean Time*, which is perfectly equable in its increase, is measured by the motion of this *Mean Sun*; the latter at certain periods agrees with the real sun, then again is in advance of it, and at other times is behind it. The clocks in ordinary use, and chronometers used by Navigators, are regulated to *mean* time.

*True or Apparent Time* is measured by the motion of the real sun.

The difference between the *true* and *mean* time is called the *Equation of Time*. By means of it we pass from *true* to *mean* time, or the reverse. Thus, if the *true* time be given, the *mean* time corresponding to it will be obtained by adding or subtracting the equation of time, according to the precept at the head of the column in which it is found, on page I. of the Calendar. If the *mean* time be given, the *true* time is obtained by applying the equation of time as directed by the precept on page II. of the Calendar.

*Day*.—The *civil day*, according to the customs of society, commences at midnight, and comprises twenty-four hours from one midnight to the next following. The hours are counted from 0 to 12 from midnight to noon, after which they are again reckoned from 0 to 12 from noon to midnight. Thus the day is divided into two periods of 12 hours each; the first of which is marked A. M., the last is marked P. M.

The *astronomical day* commences at noon of the civil day of the same date. It also comprises twenty-four hours, but they are reckoned from 0 to 24, and from the noon of one day to that of the next following. The astronomical, as well as the civil time, may be either *apparent*, or *mean*, according as it is reckoned from *apparent* noon, or from *mean* noon.

The civil day begins twelve hours before the astronomical day; therefore the first part of the *civil day* answers to the last part of the preceding *astronomical day*, and the last part of the *civil day* to the first part of the same *astronomical day*. Thus, January 10th, 2<sup>h</sup>. A. M., *civil time*, is January 9th, 14<sup>h</sup>, *astronomical time*; and January 9th, 2<sup>h</sup>. P. M., *civil time*, is also January 9th, 2<sup>h</sup>, *astronomical time*. The rule, then, for the transformation of the civil time into astronomical time is this: If the civil time is marked A. M., take one from the date, and add twelve to the hours, and the result is the astronomical time wanted; if the civil time is marked P. M., take away the designation P. M., and the astronomical time is had without further change.

If the longitude be expressed in time, and, when it is *west*, added to the local time, or, when it is *east*, subtracted from the local time, the result is the corresponding Greenwich time. If the local astronomical time is used, the result is the *Greenwich astronomical time*, which ordinarily is required for the use of this Part.

THE CALENDAR.—The Calendar is divided into twelve months, and to each month are assigned eighteen pages, of which the contents are as follows:

Page I. contains the *Apparent Right Ascension and Declination* of the Sun, and the *Equation of Time* for each Greenwich *apparent* noon. Adjoining columns contain the differences of these quantities for one hour, by means of which they may be calculated for any given Greenwich *apparent* time, by multiplying this difference by the hours and parts of an hour from Greenwich *apparent* noon, and adding the amount to, or subtracting it from, the quantity at noon, according as that quantity is increasing or decreasing. The hourly differences are given for the instant of noon at Greenwich, and, when great accuracy is required, may be first interpolated for *half* the hours and parts of an hour of the Greenwich time.

This page is chiefly used when the sun is observed on the meridian, and the local *apparent* time is 0. Then the longitude from Greenwich expressed in time, if *west*, is the Greenwich *apparent* time, or time *after* Greenwich *apparent* noon;—if *east*, it is time *before* Greenwich *apparent* noon;—and may be employed in reducing the quantities on this page to *apparent* noon at any place.

The Right Ascension of the sun thus reduced is the *Sidereal Time of Local Apparent Noon*. The difference between it and the clock time of the meridian passage of the sun is the error of the clock on sidereal time.

The declination of the sun reduced to the meridian, or apparent noon, of the place, is needed in finding the latitude from a meridian altitude of the sun.

As an example of the use of this page, let the sun's declination be required at noon of January 18th, 1869, in longitude  $146^{\circ} 4' W.$ , or  $+ 9^h 44^m 16^s$ . We first find—

For January 18th, at Greenwich *apparent* noon,  $20^{\circ} 28' 13.5'' S.$

The diff. for 1 hour,  $30''.96$ , multiplied by 9, is  $278.64$

The proportional part for  $30^m = \frac{1}{4}h$ ,  $15.48$

“ “ “  $12^m = \frac{1}{2}h$ ,  $6.19$

“ “ “  $2^m = \frac{1}{30}h$ ,  $1.03$

“ “ “  $15^s = \frac{1}{4}$  of  $2^m$ ,  $.13$

The sum to be subtracted,  $301.47$  or  $5 \ 15 \ N.$

The sun's declination required,  $20 \ 23 \ 12.0 \ S.$

The longitude  $9^h 44^m 16^s = 9^h 44^m.27 = 9^h.738$ ;

and  $30''.96 \times 9.738 = 301''.49 = 5' 1''.49$ ;

which is also the reduction obtained in another way.

If the longitude is  $146^{\circ} 4' E.$ , the reduction,  $5' 1''.5$ , should be added, and the resulting declination becomes  $20^{\circ} 33' 15''.0 S.$

If greater precision is required, the hourly difference may be first interpolated for  $4^h 52^m$  *after* noon for the *west* longitude, or for  $4^h 52^m$  *before* noon for the *east* longitude. This will give, in the first case, the hourly difference  $31''.16$ , and the resulting declination  $20^{\circ} 23' 10''.1 S.$ ; and, in the second case, the hourly difference  $30''.76$ , and the declination  $20^{\circ} 33' 13''.0 S.$

At sea, however, it is ordinarily sufficient to have the declination to the nearest half minute; and the reduction may be found by Table V of Bowditch's *American Practical Navigator*.

The *Equation of Time*, as has been before explained, is the number of minutes and seconds to be added to or subtracted from the *apparent* time, or the time given by an observation of the sun, to obtain the *mean* time. The heading of the column directs the manner in which the equation is to be applied. Where there is a change in the course of the month from addition to subtraction, or the reverse, as in the months of April and June, the two different directions are separated by a line, while a corresponding line below points out the date at which the change takes place. As given on page I. the equation of time is also the *mean* time of *apparent* noon.

On page I. are also given the *Sun's Semidiameter*, which is used in reducing the altitude of a limb of the sun, or the angular distance of the limb from the moon or some other object, to the altitude, or distance, of the centre of the sun; and the *Sidereal Time of the Semidiameter passing the Meridian*, which is employed in obtaining the passage of the sun's centre over the wires of a transit-instrument, when the passage of one limb only has been observed. The quantity found in this column is to be added to the time of transit of the *first* or western limb, to be subtracted from the time of transit of the *second* or eastern limb.

Page II. contains for each Greenwich *mean* noon the *Apparent Right Ascension* and *Declination of the Sun*, the *Equation of Time*, and the *Sidereal Time of Mean Noon*. The hourly changes of these quantities are also given for noon, and may be used in reducing them to any given Greenwich *mean* time. The hourly changes may be first interpolated for half the Greenwich time, when great precision is required.

The Right Ascension and Declination on pages I. and II. are affected by *Aberration*, and therefore denote the *apparent* position of the *true* sun. Page II. is more conveniently used when the *mean* time is known. This is the case in most observations of the sun out of the meridian, when the times have been noted by a clock or chronometer regulated to *mean* time. The quantities can be reduced to mean noon of any place by interpolating for the longitude, as in the example of the sun's declination on page 498.

The sun's declination is required for finding the latitude of the place, the local time, and the sun's azimuth and amplitude, from observations of the sun.

The equation of time is needed in finding the local time, and the latitude from other than meridian observations. The heading of the column directs the manner in which it is to be applied to *mean* time to obtain the *apparent* time.

As given on page II, the equation when *additive* is the apparent time of mean noon; and in general it is the hour angle of the *true* sun at the instant of *mean* noon.

The *Sidereal Time of Mean Noon* is also the *Right Ascension of the Mean Sun*. It may be reduced for the longitude, or to any Greenwich *mean* time, by using the hourly difference,  $9^{\text{s}}.8565$ ; or by Table III. in the appendix of the *American Ephemeris* for *reducing intervals of mean solar to sidereal time*. Table LI. of Bowditch's *Navigator*, may be used for the same purpose when the nearest quarter of a second only is required.

The sun's right ascension and the sidereal time of mean noon, or right ascension of the mean sun, are useful in converting solar time to sidereal time. If we add the right ascension of the *true* sun to the *apparent* time, or the right ascension of the *mean* sun to the *mean* time, the result will be the *sidereal* time.

The sidereal time of mean noon is also used in converting sidereal time to mean time, by first reducing it for the longitude of the place. Subtracting the reduced value from the given sidereal time, gives the interval of sidereal time from noon. Subtracting from this the corresponding reduction of a *sidereal interval to a mean time interval* in Table II. of the *American Ephemeris*, or Table LII. of Bowditch's *Navigator*, will give the mean time required. This reduction may also be found by multiplying  $9^{\text{s}}.8296$  by the hours and parts of an hour of the given *sidereal* time.

As examples of the use of page II. :—

1. Let the sun's right ascension and the equation of time be required for 1869, Jan. 24,  $8^{\text{h}} 15^{\text{m}} 16^{\text{s}}$  A. M. mean time at a place whose longitude is  $84^{\circ} 16' \text{ E}$ .

The local astronomical <i>mean</i> time is	Jan. 23, $20^{\text{h}} 15^{\text{m}} 16^{\text{s}}$
The longitude in time,	— $5^{\text{h}} 37^{\text{m}} 4^{\text{s}}$
The Greenwich <i>mean</i> time,	Jan. 23, $14^{\text{h}} 38^{\text{m}} 12^{\text{s}}$ or Jan. 23, 14.6367
	<i>Sun's R. A.</i>
Jan. 23, Noon,	$20^{\text{h}} 23^{\text{m}} 38.61^{\text{s}}$
H. D. $10^{\text{s}}.476 \times 14.6367$	$+ 2^{\text{m}} 33.33^{\text{s}}$
	$20^{\text{h}} 26^{\text{m}} 11.94^{\text{s}}$
	<i>Equation of time.</i>
Jan. 23; Noon,	$12^{\text{m}} 12.46^{\text{s}}$ <i>Subtractive.</i>
H. D. $+ 0^{\text{s}}.620 \times 14.637$	$+ 9.07^{\text{s}}$
	$12^{\text{m}} 21.53^{\text{s}}$

If greater precision is required, the hourly differences interpolated to  $7^{\text{h}}.3$ , or  $10^{\text{s}}.466$  for the right ascension, and  $0^{\text{s}}.610$  for the equation of time, should be used.

The equation of time is *subtractive* from mean time. Its reduction could have been found by Table VI. A. of Bowditch's *Navigator* to seconds only.

2. If the sidereal time is required for the same date and time, we have—

Jan. 23, Noon, the R. A. of the mean sun is	$20^{\text{h}} 11^{\text{m}} 26.15^{\text{s}}$
Add the H. D. $9^{\text{s}}.8565 \times 14.6367$ , or	$+ 2^{\text{m}} 24.27^{\text{s}}$
Add the local <i>astronomical</i> mean time	$20^{\text{h}} 15^{\text{m}} 16.00^{\text{s}}$
The required sidereal time is (rejecting $24^{\text{h}}$ from the sum)	$16^{\text{h}} 29^{\text{m}} 6.42^{\text{s}}$

The reduction  $2^{\text{m}} 24^{\text{s}}.27$  could have been found in Table III. corresponding to the Greenwich mean time,  $14^{\text{h}} 38^{\text{m}} 12^{\text{s}}$ .

3. 1869, Jan. 24, A. M., at a place whose longitude is  $84^{\circ} 16' E.$ , suppose the sidereal time to be  $16^h 29^m 6^s.42$ , and that the corresponding mean time is required.

The astronomical day is Jan. 23; the longitude in time —  $5^h 37^m 4^s$ , or —  $5^h.618$ .

Jan. 23, the sidereal time of Greenwich noon is	$20^h 11^m 26^s.15$
The H. D. $9^s.8565 \times (-5.618)$ , or the red. for $5^h 37^m 4^s$ in Table III.	— 55.37
The sidereal time of local noon,	$20^h 10^m 30^s.78$
The given sidereal time + $24^h$ ,	$40^h 29^m 6^s.42$
Subtracting the first from the second gives	$20^h 18^m 35^s.64$
— $9^s.8296 \times 20.310$ , or the red. for $20^h 18^m 36^s$ in Table II.,	— 3 19.64

The required mean time, Jan. 23,  $20^h 15^m 16.00$

Page III. contains the *Longitude and Latitude of the Sun*, and the *Logarithm of its Distance from the Earth*, at Greenwich Mean Noon of each day. The Longitude is given in two columns, headed  $\lambda$  and  $\lambda'$ ; and one,  $\lambda$ , is the Sun's longitude counted from the true equinox of the date; the other,  $\lambda'$ , is the same coördinate counted from the mean equinox of the beginning of the year. A column of hourly differences enables the computer to obtain the Sun's longitude for any hour from noon. The hourly differences of the logarithm of the Radius Vector are likewise given. The longitudes of the Sun are the true longitudes, not affected by aberration. The latitude is referred to the ecliptic of the date.

The last column on page III. contains the *Mean Time of Sidereal*  $0^h$ , or  $24^h$ —the right ascension of the mean sun. It may be reduced to any meridian by interpolating for the longitude, or to any Greenwich *sidereal* time, by means of the hourly difference, —  $9^s.8296$ . The reduction, however, can be taken directly from Table II. of the American Ephemeris, for *reducing intervals of sidereal time to mean solar time*.

This column is used in converting sidereal time to mean time. Let us take as an illustration Example 3, above.

Jan. 23, the mean time of Greenwich sidereal $0^h$ is	$3^h 47^m 56^s.41$
The H. D. — $9^s.8296 \times (-5.618)$ , or the red. for long., Table II.,	+ 55.22
The mean time of local sid. $0^h$ ,	$3^h 48^m 51^s.63$
Add the given sidereal time,	$16^h 29^m 6^s.42$
	$20^h 17^m 58^s.05$
— $9^s.8296 \times 16.485$ , or the red. of sid. time, Table II.,	— 2 42.04
The required mean time,	Jan. 23, $20^h 15^m 16.01$

If the result had been more than  $24^h$ , the mean time of sidereal  $0^h$  should have been taken out for Jan. 22, that is the *preceding* astronomical day. It was, however, readily seen in advance in this example that the result would be much less than  $24^h$ .

Page IV. contains the *Moon's Semidiameter* and *Equatorial Horizontal Parallax* for every mean noon and midnight at Greenwich. Columns adjoining those of the Horizontal Parallax give the change of this quantity in one hour, by means of which it can be reduced to any other Greenwich mean time in the same way as the sun's declination and the equation of time in the preceding examples. The sign *plus* or *minus* (+ or —) prefixed to the hourly differences, shows whether the horizontal parallax is increasing or decreasing.

The reduction of the moon's semidiameter may be readily found from the reduction of the horizontal parallax, by multiplying it by 0.272. It also may be obtained from Table XI. of Bowditch's *Navigator*, or by simply computing the proportional part.

If, for example, the semidiameter of the moon is to be taken out for 1869, Feb. 22,  $9^h$  P. M., we see that the difference of the semidiameters at noon and midnight of Feb. 22 is  $7''.8$ ; then we say—

$$\text{as } 12^h : 9^h = 7''.8 : 5''.9$$

which is the correction to be added to the semidiameter at noon, because the semidiameter is increasing. The moon's semidiameter, then, for Feb. 22 9<sup>h</sup> is  $16' 8''.1 + 5''.9$ , or  $16' 14''.0$ .

The moon's semidiameter and horizontal parallax are required for all observations of the moon. When great precision is needed, the hourly differences should be first interpolated for half the interval of Greenwich time from noon or midnight, and a correction applied to the horizontal parallax for the latitude of the place of observation.

The *Mean Time of the Moon's Meridian Passage* at Greenwich, which is given on page IV. to minutes and tenths of minutes, is also accompanied with a column of differences for one hour of longitude, by means of which, having the longitude turned into time, the time of the moon's meridian passage at any other place may be computed. The reduction may be taken from BOWDITCH'S Table XXVIII. by simple inspection. The last column of this page contains the *Age* of the Moon, or the time elapsed since the preceding new moon, to tenths of days.

Pages V. to XII., inclusive, contain the *Moon's Right Ascension* and *Declination* for each day and hour of Greenwich *mean* time. They are accompanied with columns of *differences for one minute*, which also are given at each hour. The right ascension and declination of the moon change so rapidly, that, if they were not given at frequent intervals, the moon would cease to be useful to the practical navigator as a means of determining the latitude and time. These quantities are wanted for Greenwich mean time, which is either taken directly from a well-regulated chronometer, or is obtained by applying the longitude, turned into time, to the local time of the observer. Each is taken out for the day and hour of the Greenwich *mean* time; the *diff. for 1<sup>m</sup>* multiplied by the *minutes* and parts of a minute of the Greenwich time; and the product added to, or subtracted from, the quantity, according as the quantity is increasing or decreasing.

Thus, suppose the moon's right ascension and declination are required for 1869, Jan. 3, 15<sup>h</sup> 20<sup>m</sup> 16<sup>s</sup>, astronomical mean time at Greenwich :

	<i>Right Ascension.</i>			<i>Declination.</i>		
	<sup>h</sup>	<sup>m</sup>	<sup>s</sup>	<sup>°</sup>	<sup>'</sup>	<sup>"</sup>
Jan. 3, 15 <sup>h</sup>	12	2	0.64	3	34	48.4 N.
Diff. $2^{\circ}.2288 \times 20.267$	+ 45.17			— 4 0.9		
Jan. 3, 15 <sup>h</sup> 20 <sup>m</sup> 16 <sup>s</sup>	12	2	45.81	3	30	47.5 N.

The differences interpolated for  $10^{\text{m}}.133 = 0^{\text{h}}.17$  are for the right ascension  $2^{\circ}.2284$ , and for the declination  $-11''.888$ , which may be used for greater precision.

Page XII. contains also the *Phases of the Moon* and the dates of the *Moon's Perigee* and *Apogee*, or least and greatest distances from the earth.

Pages XIII. to XVIII., inclusive, contain the *Lunar Distances*, or the angular distances of the centre of the moon from the centre of the sun, the four larger planets, and certain fixed stars, as they would appear to an observer at the centre of the earth. They are given for every third hour of Greenwich mean time, beginning at noon; the dates are therefore *astronomical*. All the distances that can be observed on the same day are grouped together under that date; and the columns are read from left to right, across both pages of the same opening. The letter W., or E., is affixed to the name of the sun, planet, or star, to indicate that it is on the west, or east, side of the moon.

An observer on the earth's surface having measured a *Lunar Distance*, corrected it for errors of his instrument and for the semidiameter of the objects, and cleared it from the effects of refraction and parallax, finds the *true*, or *geocentric*, distance. With this distance and the distances in the Ephemeris of the same bodies on the same day, the *Greenwich mean time* of the observation can be found.

To lessen the labor of computation, there is given in the Ephemeris between every two successive distances the *logarithm of the seconds of time in which the distance changes 1''*,

or, as it is usually called, the *proportional logarithm of the difference*. It is given for the middle instant of the two dates between which it is placed.

For computing the Greenwich time we have the following rule:

Find in the Almanac the two distances between which the true distance falls; take out the nearest of these, the hours of Greenwich time over it, and the *P. L. of Diff.* between them:

Find the difference between the true distance and the distance taken from the Almanac; and from the *proportional logarithm* of this difference subtract the *P. L. of Diff.* taken from the Almanac:

The result is the *proportional logarithm* of an interval of time to be *added* to the hours of Greenwich time, taken from the Almanac, when the *earlier* Almanac distance is used: to be *subtracted* from the hours of Greenwich time, when the *later* Almanac distance is used.

Or, we may *add* the *common logarithm* of the difference of the true and the Almanac distances to the *P. L. of Diff.* of the Almanac; and the sum will be the *common logarithm* of the correction to be applied to the hours of Greenwich time. A Table of *Logarithms of small Arcs of Space and Time*, such as Table I. of the American Ephemeris before 1865, or Table IX. of CHAUVENET's *Lunar Method*, saves the operation of reducing degrees (or hours) and minutes to seconds, and the reverse.

As the *P. L. of Diff.* in the Ephemeris varies, the Greenwich time, found by the methods just described, may not be sufficiently exact. To correct it for such variation, or *2d difference*, take the difference between the *P. L. of Diff.* used and the one which follows it in the Ephemeris, (or, more strictly, half the difference of the preceding and following ones.) With this difference, and the first correction of the Greenwich time already found, enter Table I. App'x p. 10, and take out the corresponding seconds, which are to be *added* to the approximate Greenwich time if the *Prop. Logs.* in the Ephemeris are *decreasing*; to be *subtracted* if they are *increasing*.

Thus the *Greenwich mean time* of the observation can be obtained. If the observer has noted the time of observation by a chronometer, the difference of this chronometer time and the Greenwich mean time will be the *error* of the chronometer as found from the Lunar Distance. The agreement or disagreement of this error with that brought up from the error and rate of a previous date, may show whether the chronometer has run well or ill. In this way Lunar distances can be used as a check upon the chronometer. By a series of carefully observed Lunar Distances on both sides of the moon, the chronometer error can be tolerably well ascertained.

If the observer has found the *local mean time* of observation from the observed altitude of one of the bodies, or by a watch regulated to that time by recent observations, the difference of this local time and the Greenwich time found from the Lunar Distance will be his longitude.

As an example of finding the Greenwich mean time from a Lunar Distance, suppose that on 1869, Feb. 24, about 7<sup>h</sup> of Greenwich astronomical time, the corrected distance of the moon's centre from  $\alpha$  Tauri (*Aldebaran*) is  $64^{\circ} 13' 16''$ :

Corrected distance,	$64^{\circ} 13' 16''$			
Distance in the Ephemeris, Feb. 24, 6 <sup>h</sup> 0 <sup>m</sup> 0 <sup>s</sup>	$63^{\circ} 31' 31''$	P. L.	.2028	2028
Difference,	$41' 45''$	P. L.	.6346	6346
Time after 6 <sup>h</sup>	+ 1 6 36	P. L.	.4318	4318
Corr. for 2d Diff., Table I.,	+ 3	Diff. of P. Logs.	- 11	11
Greenwich Mean Time, Feb. 24,	7 6 39			



By a Table of common logarithms, or a Table of logarithms of small arcs, the reduction of the Greenwich time would be found thus :

P. L. from Ephemeris,		0.2028
Diff. of distances,	41' 45" = 2505"	log 3.3988
Red. of Greenwich time, + 1 <sup>h</sup> 6 <sup>m</sup> 36 <sup>s</sup> = 3996 <sup>s</sup>		log 3.6016

the result being the same as by the previous method.

Pages 218 to 241, inclusive, contain the Ephemeris of the four principal Planets, Venus, Mars, Jupiter, and Saturn. The Ephemeris of each consists of its *apparent right ascension and declination*, and their *variations in one hour*, for each Greenwich mean noon; the *mean time of meridian passage*; and, at the bottom of the page, the *semidiameter* and *horizontal parallax*.

North declinations are marked +, south declinations —. + prefixed to the hourly change of declination indicates that north declinations are increasing, and south declinations are decreasing; — indicates that north declinations are decreasing, south declinations increasing.

The right ascension and declination are needed in all observations of the planet for time, latitude, or azimuth. The mode of reducing them to any instant of Greenwich mean time is the same as in the examples of the sun previously given. The mean time of passage across any meridian can be found by dividing the *daily* difference by 24, and using the *hourly* difference thus obtained, as in the case of the moon; or, the reduction can be found by the proportion: As 24<sup>h</sup> (or 360°) is to the longitude, so is the daily difference to the reduction required.

Pages 242 to 244 contain the SUN's *Rectangular Coördinates* referred to the equator and equinox of the date. They were employed in computing the Ephemeris of the Planets. The day of the year, or number of days from January 0, is also given.

Pages 245 to 248 contain the MOON's *true longitude and latitude* for each Greenwich mean noon and midnight. The right ascensions and declinations of the moon have been computed from them.

Pages 261 to 264 contain the *Mean Places*, with their *annual variations*, of one hundred and ninety-eight Fixed Stars for the beginning of the year 1869. North declinations are marked +; south declinations —.

The right ascension of a star is also the *sidereal time* of its meridian passage. From this we may roughly find the mean time of meridian passage by adding the *mean time of sidereal 0<sup>h</sup>* on page III. of the Calendar, or subtracting the *sidereal time of mean noon* on page II., (disregarding seconds;) but we can find it more exactly by the processes already given for converting sidereal time to mean time.

The right ascension and declination of a star are generally needed in observations of it for time, latitude, or azimuth. The mean places are sufficiently accurate for most observations at sea; but for more exact observations, the *apparent* places given on pages 265 to 325 should be used.

## THE ASTRONOMICAL PART.

This part is adapted to the meridian of Washington; and Washington time, *astronomical* or *sidereal*, is required in its use. The longitude of Washington from Greenwich is assumed to be  $+5^h 8^m 12^s$ .

*Obliquity of the Ecliptic, &c.*, page 250.—This page contains for every ten days of the year the *Apparent Obliquity*, which is required for the transformation of longitudes and latitudes to right ascensions and declinations, or the reverse; the *Equation of Equinoxes* in longitude and right ascension, or the reduction from the *mean* to the *true* equinox of the date; the *Precession of Equinoxes* in longitude, or the reduction of longitudes from the mean equinox of the *beginning* of the year to the mean equinox of the *date*; the *Sun's Aberration*, which is to be applied to the *true* longitude of the sun, as given in the *Ephemeris*, to obtain its *apparent* longitude; the *Sun's Horizontal Parallax*; and the *Mean Longitude of the Moon's Ascending Node*.

At the bottom of the page are given the *Mean Obliquity* for the beginning of the year; the *Annual Precession* for the middle of the year; the *logarithms* of the precession in a sidereal and in a solar day; and the *daily motion* of the moon's node in longitude.

*Fixed Stars.*—Pages 251–259 contain for each mean midnight the logarithms of *A*, *B*, *C*, *D*, also *f*, *G*, *H*, and logarithms of *g*, *h*, and *i*, (following BESSEL's notation), for reducing the *mean* places of the Fixed Stars at the beginning of the year to their *apparent* places on any day.

The formulæ from which they are derived, and those in which they are used, are given on page 260. The coefficients are those of PETERS and STRUVE. They are expressed in *arc*, but for right ascensions are readily converted to *time* by dividing by 15.

The first set of quantities require for the star the logarithms of *a*, *b*, *c*, *d*,\* *a'*, *b'*, *c'*, *d'*, which are to be found in the Star Catalogues. The other set require no other star constants than the right ascensions and declinations. *f*, *G*, and *H* are given in time, as well as *arc*, to facilitate their use with tables of sines, &c., which have the argument in time.

Tables IV., V., and VI., in the Appendix, give corrections of the apparent places of several circumpolar stars, and of the quantities *A* and *B* for small terms of nutation.

For a star near the pole, it is best to compute the reductions with the time constants and the mean right ascension and declination at the date, instead of the beginning of the year, (or the logarithms of *a*, *b*, *c*, &c., reduced to the date), and add such of the following terms as may be of sufficient magnitude:

In Right Ascension.		In Declination.	
$+0''.00004 \tau^2 \sin a$	$\left. \begin{array}{l} \tau^2 \sin a \\ \tau^2 \cos a \end{array} \right\} \tan \delta$	$+0''.000975 \tau^2 \sin^2 a$	$\left. \begin{array}{l} \tau^2 \sin^2 a \\ \cos 2 \Omega \\ \cos 2 \Omega \cos 2 a \\ \sin 2 \Omega \sin 2 a \\ \cos 2 \Omega \\ \cos 2 \Omega \cos 2 a \\ \sin 2 \Omega \sin 2 a \end{array} \right\} \tan \delta$
$-0''.00224 \tau^2 \cos a$		$-0''.000023 \cos 2 \Omega$	
$-0''.000975 \tau^2 \sin 2 a$	$\left. \begin{array}{l} \tau^2 \sin 2 a \\ \sin 2 \Omega \cos 2 a \\ \cos 2 \Omega \sin 2 a \end{array} \right\} \tan^2 \delta$	$-0''.000080 \cos 2 \Omega \cos 2 a$	
$+0''.000154 \sin 2 \Omega \cos 2 a$		$-0''.000077 \sin 2 \Omega \sin 2 a$	
$-0''.000163 \cos 2 \Omega \sin 2 a$		$+0''.000040 \cos 2 \Omega$	
$+0''.000930 \sin 2 \Omega \cos 2 a$	$\left. \begin{array}{l} \sin 2 \Omega \cos 2 a \\ \cos 2 \Omega \sin 2 a \end{array} \right\} \sec^2 \delta$	$-0''.000467 \cos 2 \Omega \cos 2 a$	
$-0''.000933 \cos 2 \Omega \sin 2 a$		$-0''.000465 \sin 2 \Omega \sin 2 a$	
$+0''.00077 \sin (\odot + \Omega) \cos 2 a$	$\left. \begin{array}{l} \sin (\odot + \Omega) \cos 2 a \\ \cos (\odot + \Omega) \sin 2 a \\ (\odot - \Omega) \cos 2 a \\ (\odot - \Omega) \sin 2 a \end{array} \right\} \tan \delta \sec \delta$	$-0''.00004 \cos (\odot + \Omega)$	$\left. \begin{array}{l} \cos (\odot + \Omega) \cos 2 a \\ \sin (\odot + \Omega) \sin 2 a \\ \cos (\odot - \Omega) \cos 2 a \\ \sin (\odot - \Omega) \sin 2 a \end{array} \right\} \sin \delta \tan \delta$
$-0''.00076 \cos (\odot + \Omega) \sin 2 a$		$-0''.00038 \cos (\odot + \Omega)$	
$+0''.00015 \sin (\odot - \Omega) \cos 2 a$		$-0''.00038 \sin (\odot + \Omega)$	
$-0''.00008 \cos (\odot - \Omega) \sin 2 a$		$+0''.00038 \cos (\odot - \Omega)$	
		$-0''.00004 \cos (\odot - \Omega)$	
		$-0''.00007 \sin (\odot - \Omega)$	

Pages 261–264 contain the *mean places* and their *annual variations* of 198 Fixed Stars for 1869, Jan. 0<sup>h</sup>—407, or the instant when the sun's mean longitude was 280°.  $\tau$  on the preceding pages is reckoned from the same epoch. Stars within 25° of either pole are designated by a \*.

\*The logarithms of  $\frac{1}{15}$  of *a*, *b*, *c*, and *d* are given, so that the reductions of right ascensions shall be in time.

The *apparent* places of  $\alpha$ ,  $\delta$ , and  $\lambda$ , Ursæ Minoris, and of 51 Cephei, are given on pages 265–276 for every upper transit at Washington. They include the terms depending on  $2\text{C}$ , as well as other small terms on pages 260 and 504, so far as they were of sufficient importance.

The *apparent* places of the remaining 194 stars follow on pages 277–325 in the order of their right ascensions. They are given for every tenth transit, together with *ten times* their *daily* motion at transit; and include all terms of the preceding formulæ exceeding  $0^{\circ}.003$  in right ascension, or  $0^{\circ}.03$  in declination, except those which depend on  $2\text{C}$  and  $\text{C} - \text{I}^{\circ}$ . The mean solar time of transit is also given to the nearest tenth of a day.

*Solar Ephemeris.*—Pages 326–331 contain the *Apparent Right Ascension* and *Declination* of the SUN for each mean and apparent noon at Washington; the *Hourly Motion* at mean noon; the *Equation of Time* at apparent noon with the sign of its application to apparent time; the SUN's *Semidiameter* and the *Sidereal Time of its passing the Meridian*; and the *Sidereal Time of Mean Noon*. The explanation of these quantities and their use has already been given on pages 497–499.

The SUN's *Horizontal Parallax* is on page 250.

*Moon Culminations.*—Pages 332–334 contain the mean solar time of the *Upper Transit* of the MOON's centre at Washington, expressed to hundredths of a minute; the *difference* for *one hour* of longitude, and the *Sidereal Time of Semidiameter passing the Meridian*, both given for the instant of transit at Washington. The numbers in the fifth column indicate the four STARS in the list of *Moon Culminating Stars*, pages 335–338, the two preceding and the two next following the moon, proper to be observed with the moon at each transit. The *bright Limb* of the Moon is indicated by the Roman numerals in the last column.

The time of transit at any place, within six hours of Washington in longitude, may be found with sufficient accuracy from the time of the Washington transit by using the hourly difference interpolated for a longitude *half* that of the given place. With this time, reduced to Greenwich time, the moon's right ascension can be taken from the Lunar Ephemeris, pages V–XII of each month, as in the example on page 501. If greater precision is required, or the place is more than six hours from Washington, we may from the right ascension thus obtained, which is nearly the *local sidereal time*, find the *local mean time* (as on page 500) more accurately than before, and thence the *Greenwich mean time*, and with this revise the computation.

As an example, suppose the right ascension of the bright limb of the moon to be required at the transit of April 25 at Rio Janeiro, Brazil, in longitude

E. from Washington,  $2^{\text{h}} 15^{\text{m}} 43^{\text{s}} = -2^{\text{h}}.262 = -0^{\text{d}}.0943$ .

W. from Greenwich,  $2^{\text{h}} 52^{\text{m}} 29^{\text{s}}$ .

Transit at Washington, (p. 332) . . . . .	April 25, 12	<sup>h</sup> 1.79
Hourly motion, . . . . .	$2^{\text{m}}.259 \times (-2.262) =$	$- 5.11$
Transit at Rio Janeiro, . . . . .	April 25, 11	56.68
Longitude from Greenwich . . . . .	$+$	2 52.48
Greenwich mean time . . . . .	April 25, 14	49.16
April 25, 14 <sup>h</sup> (p. 66), Moon's R. A. . . . .	14 11	<sup>h</sup> <sup>m</sup> 20.03
Diff. for 1 <sup>m</sup> . . . . .	$2^{\text{s}}.3387 \times 49.16 =$	$+ 1 54.97$
April 25, 14 <sup>h</sup> 49 <sup>m</sup> .16, Moon's R. A. . . . .	14 13	15.00
Sid. time of semidiam. passing, (p. 332) . . . . .	$- 1$	9.01
R. A. of bright limb at its transit at Rio Janeiro . . . . .	14 12	5.99
The approximate Declination is $-8^{\circ} 9'$ .		

The above hourly motion,  $2^{\text{m}}.259$  is found by interpolating *back*  $0^{\text{d}}.047$  from that given on p. 332; and the change of right ascension in 1<sup>m</sup>,  $2^{\text{s}}.3387$ , by interpolating to 25<sup>m</sup> in *advance* of that given on p. 66 for April 25, 14<sup>h</sup>. The time of semidiameter passing the meridian is interpolated *back*  $0^{\text{d}}.094$

from that given on p. 332, and is *subtracted* from the right ascension of the centre, since the bright limb is I.,\* or the *preceding* one.

The Greenwich mean time computed from the right ascension of the moon's centre is 0<sup>m</sup>.012, and the revised right ascension 0<sup>m</sup>.03, less than those stated above.

*Moon Culminating Stars*, pages 335–338.—The *mean* places, with their annual variations, of 174 stars near the moon's path are given for the beginning of the fictitious year (1869, Jan. 0<sup>d</sup>—407). The names of 35 of them, whose *apparent* places are given in the Ephemeris of the *Fixed Stars*, are printed in SMALL CAPITALS.

The *apparent* places of the others may be obtained by the quantities and formulæ on pages 251–260. To illustrate the use of these, suppose the apparent place of No. 107, 2 Libræ, one of the four stars proper to be observed with the moon on the 25th April, to be required at its transit at Rio Janeiro at that date.

The Washington mean time of transit is April 25, 9<sup>h</sup>.7. The quantities from p. 251, or p. 255, are to be taken for a date 2<sup>h</sup>.3 = 0<sup>d</sup>.10 *before* midnight of April 25, for which they are there given.

## 1st Method.

(Star Tables)	log <i>a</i>	0.5078	log <i>b</i>	8.0353	log <i>c</i>	8.7502 <sub>n</sub>	log <i>d</i>	8.5808 <sub>n</sub>
(p. 251)	log <i>A</i>	8.5971	log <i>B</i>	0.7824	log <i>C</i>	1.1816 <sub>n</sub>	log <i>D</i>	1.0787 <sub>n</sub>
(Star Tables)	log <i>a</i>	1.2203 <sub>n</sub>	log <i>b'</i>	9.7486	log <i>c'</i>	9.5020	log <i>d'</i>	9.2032
	log <i>Aa</i>	9.1049	log <i>Bb</i>	8.8177	log <i>Cc</i>	9.9318	log <i>Dd</i>	9.6595
	log <i>Aa'</i>	9.8174 <sub>n</sub>	log <i>Bb'</i>	0.5310	log <i>Cc'</i>	0.6836 <sub>n</sub>	log <i>Dd'</i>	0.2819 <sub>n</sub>

(p. 337)	<i>a</i>	= 14 16 22.79	<i>δ</i>	= -11° 6' 52.7"
	<i>Aa</i>	= + 0.127	<i>Aa'</i>	= - 0.66
	<i>Bb</i>	= + 0.066	<i>Bb'</i>	= + 3.40
	<i>Cc</i>	= + 0.855	<i>Cc'</i>	= - 4.83
	<i>Dd</i>	= + 0.457	<i>Dd'</i>	= - 1.91
	<i>E</i>	= - 0.002	<i>μ'</i>	= - 0 <sup>h</sup> .09 <i>τ μ'</i> = - 0.03
	<i>μ</i>	= + 0 <sup>h</sup> .001 <i>τ μ</i> = 0		
<i>Appr. Place,</i>	<i>a'</i>	= 14 16 24.29	<i>δ'</i>	= - 11 6 56.7

## 2d Method.

(p. 337)	$a = 14^{\text{h}} 16.4^{\text{m}}$	$\delta = -11^{\circ} 7'$		
(p. 255)	$G = 5^{\text{h}} 30.1^{\text{m}}$	$G + a = 19^{\text{h}} 46.5^{\text{m}} = 296^{\circ} 37'$		
"	$H = 15^{\text{h}} 26.9^{\text{m}}$	$H + a = 5^{\text{h}} 43.3^{\text{m}} = 85^{\circ} 50'$		
$\log \frac{1}{\gamma}$	8.8239	$\log \frac{1}{\gamma}$	8.8239	$a = 14^{\text{h}} 16^{\text{m}} 22.79^{\text{s}}$
$\log g$	0.7861	$\log h$	1.2867	$f = + 0.119$
$\text{l. sin } (G + a)$	9.9513 $\pi$	$\text{l. sin } (H + a)$	9.9988	$(g) = + 0.073$
$\text{l. tan } \delta$	9.2934 $\pi$	$\text{l. sec } \delta$	0.0082	$(h) = + 1.311$
$\log (g)$	8.8547	$\log (h)$	0.1176	$\tau \mu = 0$
<i>Apparent Right Ascension</i> . . . . .				$a' = 14^{\text{h}} 16^{\text{m}} 24.29^{\text{s}}$
$\log g$	0.7861	$\log h$	1.2867	
$\text{l. cos } (G + a)$	9.6514	$\text{l. cos } (H + a)$	8.8621	$\delta = -11^{\circ} 6' 52.7''$
$\log (g')$	0.4375	$\text{l. sin } \delta$	9.2851 $\pi$	$(g') = + 2.74$
$\log i$	0.8189 $\pi$	$\log (h')$	9.4339 $\pi$	$(h') = - 0.27$
$\text{l. cos } \delta$	9.9918			$(i') = - 6.47$
$\log (i)$	0.8107 $\pi$	$\mu' = - 0''.09$	$\tau \mu' = - 0.03$	
<i>Apparent Declination</i> . . . . .				$\delta' = -11^{\circ} 6' 56.7''$

The MOON'S *Semidiameter* and *Equatorial Horizontal Parallax* for each mean noon and midnight are on pages 339–342.† In the moon's ephemeris, as in that of the sun, the hourly motions belong to the instant for which they are given. The hourly motion of semidiameter is equal to .2723 times that of the horizontal parallax.

\*The moon is so nearly full, that limb II. is but slightly defective.

†For eclipses and occultations, BURCKHARDT'S value of the semidiameter, which is 2<sup>h</sup> 5 less, is preferred

The times of the *Moon's Phases, Apogee, Perigee, and greatest Libration*, are given on page 343; and the position of the *Moon's Equator* and the *Moon's mean longitude* on page 344.

The *Ephemerides of Mercury and Venus* (pp. 345–356) are given for *mean noon* and at *transit*, the mean time of which is in the last column; and those of the *exterior planets* (pp. 357–386) for *sidereal noon* and the time of transit. The column “day of the month” for the exterior planets contains the mean time of sidereal noon to the nearest tenth of a day.

The place of a planet for any number of minutes,  $t$ , from the *nearest noon* for which it is given,  $t$  being negative when the time precedes the noon, may be computed by the formulæ

$$\begin{aligned} a &= a_0 + t a' + t^2 b, \\ \delta &= \delta_0 + t \delta' + t^2 b', \end{aligned}$$

$a$  and  $\delta$  denoting the right ascension required,  $a_0$  and  $\delta_0$ , the right ascension and declination at the nearest *noon*;  $a$  and  $\delta'$  their variations in one minute at noon. The logarithms of  $a$  and  $b$ ,  $\delta'$  and  $b'$ , are given with the ephemeris. For an interior planet,  $t$  must be expressed in minutes of *mean time*; for an exterior planet, in minutes of *sidereal time*. If  $t$  is restricted to  $12^h$ , the error of interpolation will not exceed  $\frac{1}{48}$  of the entire third difference.

The *Horizontal Parallaxes, Vertical Semidiameters and Sidereal Times of the Semidiameters passing the Meridian* are on pages 387 and 388.

The *Sun's Coördinates* (pp. 389–400) are given for each mean noon and midnight, referred to the apparent equinox and equator, and also to the mean equinox and equator at the beginning of the year (Jan. 0<sup>d</sup>.0). In the case of the rectangular coördinates, only the last four decimals are given for the mean equinox and equator, and the first three places are to be taken from the apparent equinox and equator. When a change of a unit is to be made in the third place, it is indicated by a corresponding colon (:). The latitude is referred to the ecliptic of the date. The reduction to the mean ecliptic of Jan. 0. is  $+0''.488 \mp \sin (\odot + 187^\circ)$ .

The *Heliocentric Coördinates* of the Planets (pp. 401–408) are referred to the mean equinox and ecliptic of the mean noon of the 2400,000th day of the Julian Period, and the dates for which they are given are counted from this epoch in mean solar days. They may be converted into days of the Julian Period by adding 2400,000. The columns  $-\frac{k^2}{r^3}x$ , &c., contain the quantities —  $1600 m \frac{k^2}{r^3}x$ , —  $1600 m \frac{k^2}{r^3}y$ , —  $1600 m \frac{k^2}{r^3}z$ , in units of the 7th decimal place, in which  $m$  denotes the mass of the planet, and  $k^2$  the unit of attractive force in the solar system, or  $\log k = 8.2355814$ .

Page 408 contains the *Inclinations and Longitudes of the Ascending Nodes* at the same epoch, and the logarithms of the *Masses*. The changes of the former in 100 days include the motions of the ecliptic and equinox.

*Eclipses*.—Pages 409–415 contain the elements necessary for computation and the principal phases of each eclipse of the SUN and MOON. The semidiameters of the moon are  $2''.5$ , and those of the sun  $2''.2$ , less than those in the Ephemeris.

The charts of the *Solar Eclipses* show the part of the world in which each is visible. The dotted curves pass through places, where the eclipse begins, or ends, at an exact hour of Washington mean time, and aid in finding an approximate time of the beginning, or ending, at any place. The limits and central line will give some idea of the magnitude of the eclipse. The longitudes are reckoned west from Washington.

The Tables of *Data of the Solar Eclipses* contain certain quantities\* derived from the elements and independent of the place of observation. They are given for successive

\* The formulæ are given in CHAUVENET'S *Spherical and Practical Astronomy*, Vol. I, page 513. The changes of  $A$ ,  $B$ , and  $C$  for one minute, or one second, are expressed in units of the sixth decimal place.

times at the Washington meridian; and if their values for the *Penumbra* be taken out for a time  $T_0$ , assumed near that of the beginning or end of the eclipse at any place, the prediction for that place may be computed quite accurately by the following formulæ:

$$\begin{aligned} \text{Let } \varphi &= \text{the latitude of the place, } + \text{ when north,} \\ \lambda &= \text{its longitude from Washington, } + \text{ when west,} \\ (\text{Bessel.}) \quad \log e &= 8.912205, \quad \log (1 - e^2) = 9.9970916, \quad \sin \chi = e \sin \varphi, \\ h &= \sec \chi \cos \varphi, \quad k = (1 - e^2) \sec \chi \sin \varphi. \\ a &= A - h \sin (\mu - \lambda), \\ b &= B - E k + G h \cos (\mu - \lambda), \\ c &= -C + F k - H h \cos (\mu - \lambda), \\ m &= \sqrt{b c} \quad (\text{usually with same sign as } a). \end{aligned}$$

If  $m = a$ , the time  $T_0$  is correctly chosen. If  $m$  differ from  $a$ , a correction  $t$  of the assumed time may be obtained in seconds by the formulæ,

$$\begin{aligned} \log \mu' &= 1.86167, \quad a' = A' - \mu' h \cos (\mu - \lambda), \\ \tan \frac{1}{2} Q &= \frac{c}{m} = \frac{m}{b}, \quad b' = B' - \mu' G h \sin (\mu - \lambda), \\ t &= \frac{1000000 (m - a)}{a' + b' \cot Q} \end{aligned}$$

and a new approximation to the actual Washington time will be

$$T_0' = T_0 + t,$$

with which the computation may be revised.

Thus successive approximations are made until for the last assumed time  $T_0$ ,  $m = a$  very closely, and  $t$  is quite small. The local mean time of the phenomenon will be, using the last values of  $T_0$  and  $t$ ,

$$T_0 + t - \lambda.$$

$Q$  must be taken of the same sign with  $a$ , and is a sufficiently near approximation to the angular distance of the point of contact reckoned from the *north* point of the sun's limb towards the *east*.

For a total or annular eclipse, the prediction of the interior contacts may be made in the same way, using the *Data* for the *Shadows*; except that  $Q$  will have a sign opposite that of  $a$  in a total eclipse.

To find  $V$ , the angular distance of the point of contact from the *Vertex* of the sun's limb towards the *east*, we have the formulæ

$$\begin{aligned} p \sin P &= \sin \varphi & c \sin C &= \cos P \tan (\mu - \lambda) \\ p \cos P &= \cos \varphi \cos (\mu - \lambda) & c \cos C &= \sin (P - \delta') \\ V &= Q - C, \end{aligned}$$

in which  $\delta'$  is the sun's declination.

If the values of  $Q$  at the beginning and at the end of the eclipse be found, and their difference (with regard to signs) be denoted by  $2\theta$ , the number of digits eclipsed is

$$12 (1 + n) \sin^2 \frac{1}{2} \theta, \quad \text{or } 12 (1 + n) \cos^2 \frac{1}{2} \theta,$$

according as  $\theta$  is acute or obtuse:  $n$  is the quotient of the semidiameter of the moon divided by that of the sun.

$\theta$  may also be found from the formulæ

$$\tan R = \frac{b'}{a'} \quad \theta = Q + R$$

(in which  $R$  has the sign of  $b'$ ); and the expression of  $t$  may be changed to

$$t = 1000000 \cdot \frac{m - a}{a'} \cdot \frac{\sin Q \cos R}{\sin \theta}.$$

The following is an example of the computation of the beginning of the Eclipse of August 7, 1869, for the Observatory at Washington, for which

$$\varphi = +38^{\circ} 53' 39''.3$$

$$\lambda = 0^{\circ} 0' 0''$$

$$(1) \quad \log e = 8.912 \ 205$$

$$(2) \quad \text{l. sin } \varphi = 9.797 \ 8801$$

$$(3) \quad \log (1 - e^2) = 9.997 \ 0916$$

$$(4) \quad \text{l. sec } \chi = 0.000 \ 5721$$

$$(5) \quad \text{l. cos } \varphi = 9.891 \ 1505$$

$$(1) + (2) \quad \text{l. sin } \chi = 8.710 \ 085$$

$$(2) + (3) + (4) \quad \log k = 9.795 \ 5438$$

$$(4) + (5) \quad \log h = 9.891 \ 7226$$

By the chart, the Washington mean time of the beginning of the eclipse at Washington is  $5^{\text{h}} 2^{\text{m}}$ . Computation like the following gives as a second approximation to that time,  $T_0 = 5^{\text{h}} 2^{\text{m}}.45$ .

For a nearer approximation we take from the table for *Penumbra*, on page 415, the values of  $A$ ,  $B$ ,  $C$ , &c., for  $5^{\text{h}} 2^{\text{m}}.45$ .

*Computation of  $t$ , the correction of  $T_0$ .*

	$\mu = 74^{\circ} 15' 16.1''$	(9)	$\log E = 9.982898$
	$\mu - \lambda = 74^{\circ} 15' 16.1''$	(10)	$\log k = 9.795544$
		(11)	$\log F = 9.981731$
(1)	$\text{l. sin } (\mu - \lambda) = 9.983390$	(9) + (10)	$\log. E k = 9.778442$
(2)	$\log h = 9.891723$	(10) + (11)	$\log. F k = 9.777275$
(3)	$\text{l. cos } (\mu - \lambda) = 9.433554$		
(4) = (1) + (2)	$\log. h \sin (\mu - \lambda) = 9.875113$	(12)	$A = + .23165$
(5)	$\log \mu' = 1.86167$	(13)	$- h \sin (\mu - \lambda) = - .75009$
(6)	$\log G = 9.439709$	(14)	$B = + 1.19736$
(7) = (2) + (3)	$\log. h \cos (\mu - \lambda) = 9.325277$	(15)	$- E k = - .60040$
(8)	$\log H = 9.453462$	(16)	$G h \cos (\mu - \lambda) = + .05821$
(6) + (7)	$\log. G h \cos (\mu - \lambda) = 8.764986$	(17)	$- C = - .12759$
(7) + (8)	$\log. H h \cos (\mu - \lambda) = 8.778739$	(18)	$F k = + .59879$
(5) + (7)	$\log. \mu' h \cos (\mu - \lambda) = 1.18695$	(19)	$- H h \cos (\mu - \lambda) = - 0.6008$
(4) + (5) + (6)	$\log. \mu' G h \sin (\mu - \lambda) = 1.17649$	(12) + (13)	$a = - .51844$
(20)	$\log b = 9.81635$	(14) + (15) + (16)	$b = + .65517$
(21)	$\log c = 9.61397$	(17) + (18) + (19)	$c = + .41112$
(22) = $\frac{1}{2} [(20) + (21)]$	$\log m = 9.71516 n$		$m = - .51899$
(22) - (20) = (21) - (22)	$\text{l. tan } \frac{1}{2} Q = 9.89881 n$		$m - a = - .00055$
Angle from <i>N. point</i> ,	$Q = 76^{\circ} 46' .2$	(23)	$A' = + 156.23$
(29)	$\text{l. cot. } Q = 9.37127 n$	(24)	$- \mu' h \cos (\mu - \lambda) = - 15.38$
(30)	$\log b' = 1.6725 n$	(25)	$B' = - 32.03$
(29) + (30)	$\log. b' \cot Q = 1.0438$	(26)	$- \mu' G h \sin (\mu - \lambda) = - 15.01$
(31)	$\log (m - a) + 6 = 2.7404 n$	(25) + (26)	$b' = - 47.04$
(32)	$\log (a' + b' \cot Q) = 2.1816$	(27) = (23) + (24)	$a' = + 140.85$
(31) - (32)	$\log t = 0.5588 n$	(28)	$b' \cot Q = + 11.06$
		(27) + (28)	$a' + b' \cot Q = + 151.91$

Assumed time, . . . . .  $T_0 = 5^{\text{h}} 2^{\text{m}} 27.00$

Correction of the assumed time, . . . . .  $t = - 3.62$

Washington mean time of beginning, . . . . .  $T_0 + t = 5^{\text{h}} 2^{\text{m}} 23.4$

We shall also have  $C = 89^\circ 55'$  and the angle from the *Vertex*,  $V = -166^\circ 41'$ ;  $\phi = -95^\circ 14'$  and the magnitude of the eclipse 11.1 digits, or 0.93 of the sun's disc, on the south limb.

*Occultations.*—Pages 416–454 contain *Elements for facilitating the Prediction of Occultations of Planets and Stars by the Moon*. The list includes all stars to the  $6\frac{1}{2}$  magnitude in the *Catalogue of the British Association*, and a few others of less magnitude contained in the *Almanac Catalogue of Zodiacal Stars*, and chiefly belonging to clusters, which can be occulted during the year 1869.

The elements comprise the *Date, Name and Magnitude of the Star*; the *Limiting Latitudes* within which the occultation may be visible;

$\delta$  = Washington mean time of geocentric conjunction of the moon and stars in right ascension;

and at this time,

$H$  = Hour angle of the star at Washington, + when west,

$$X = \frac{15(a - a')}{\pi} \cos \delta = 0, \quad Y = \frac{\delta - \delta'}{\pi},$$

$$x' = \frac{15 \Delta a}{\pi} \cos \delta, \quad y' = \frac{\Delta \delta}{\pi}, \text{ the hourly changes of } x \text{ and } y;$$

also  $\log \sin \delta'$  and  $\log \cos \delta'$ ;

in which  $a$  and  $\delta$  are the true right ascension and declination of the moon,

$\Delta a$  and  $\Delta \delta$ , their motions in one hour of mean time,

$\pi$ , the moon's equatorial horizontal parallax,

$a'$  and  $\delta'$ , the apparent right ascension and declination of the star.

For any other Washington mean time  $T = \delta + t$ , we have ( $\mu$  being the sidereal equivalent of  $t$ , and  $t$  as a coefficient being expressed in hours)

$h = H + \mu$ , the star's hour angle at Washington,

$x = t x'$ ,  $y = Y + t y'$ .

The moon's motion is here regarded as uniform, the expressions for  $x$  and  $y$  are therefore more nearly correct the smaller the interval  $t$ . The exact values, to be employed in the reduction of an observed occultation, are

$$x = \frac{\sin(a - a') \cos \delta}{\sin \pi}$$

$$y = \frac{\sin(\delta - \delta') \cos^2 \frac{1}{2}(a - a') + \sin(\delta + \delta') \sin^2 \frac{1}{2}(a - a')}{\sin \pi}$$

in which  $a$ ,  $\delta$  and  $\pi$  are to be taken from the Ephemeris for the time  $T$ . But for predicting the times of *immersion* and *emersion*, and the points on the moon's limb where these appearances take place, the preceding expressions suffice to enable the observer to determine when and where to watch for these phenomena.

For the place of observation, let

$\phi$  = its latitude, + when north;

$\lambda$  = its longitude from Washington, + when west;

$$(\text{Bessel.}) \log e = 8.9122 \ 05, \quad \log(1 - e^2) = 9.9970 \ 916,$$

$$\sin \chi = e \sin \phi, \quad E = (1 - e^2) \sec \chi, \quad F = \sec \chi.$$



The values of  $E$  and  $F$  and their logarithms are given for different latitudes in the following table :

$\varphi$	$E$ .	$F$ .	Log $E$ .	Log $F$ .
$0^\circ$	1—.0067	1.0000	9.9971	0.0000
$\pm 10$	1—.0066	1.0000	9.9971	0.0000
20	1—.0063	1.0004	9.9973	0.0002
30	1—.0059	1.0008	9.9975	0.0004
40	1—.0053	1.0014	9.9977	0.0006
50	1—.0047	1.0020	9.9979	0.0009
60	1—.0042	1.0025	9.9982	0.0011
70	1—.0037	1.0030	9.9984	0.0013
80	1—.0034	1.0033	9.9985	0.0014
90	1—.0033	1.0034	9.9985	0.0014

An occultation will not be visible unless,

1. The latitude of the place is included within the limiting parallels ;
2. At the time of occultation, or the local mean time ( $T - \lambda$ ), the sun is sufficiently below the horizon ;
3. At that time the star is above the horizon, or its local hour angle ( $h - \lambda$ ) is numerically less than  $\tau$  found by the formula

$$\cos \tau = -\tan \varphi \tan \delta'.$$

A table of  $\tau$ , or the hour angle of a body in the horizon, computed for different declinations, will be useful for such comparisons.

These conditions can generally be determined in advance, as in latitudes less than  $60^\circ$  ( $\delta - \lambda$ ) may be used instead of ( $T - \lambda$ ) except within two hours of sunrise or sunset ; and ( $H - \lambda$ ) instead of ( $h - \lambda$ ) except within half an hour of the star's rising or setting. For these exceptional cases, which, however, are not favorable for observation, the time of *apparent* conjunction in right ascension, or some nearer approximation to the time of occultation, can be subsequently employed.

The elements are given for the time of *geocentric* conjunction of right ascension of the moon and star. The time of *apparent* conjunction, as affected by parallax, may be found approximately by the following formulæ :

$$\begin{aligned} \mu' &= 54147.8 \sin 1'' = .2628 & u &= F \cos \varphi \sin (H - \lambda) \\ \log \mu' &= 9.41916 & u' &= \mu' F \cos \varphi \cos (H - \lambda) \end{aligned}$$

$$\text{In hours,} \quad (t) = \frac{u}{x' - u'}$$

$$\begin{array}{llll} \text{Washington time of } \textit{apparent} \text{ conjunction, } & (T) = \delta + (t) \\ \text{Local} & \text{“} & \text{“} & \text{“} & (T) - \lambda \end{array}$$

The value of ( $T$ ) to the nearest tenth of an hour is sufficiently accurate. If a closer approximation is desired, the computation may be repeated, using  $h = H + (\mu)$  instead of  $H$ ,

$$\begin{aligned} x &= (t) x' & (t') &= -\frac{x - u}{x' - u'} \\ & & (T') &= (T) + (t'). \end{aligned}$$

Let  $T = \delta + t$  be an assumed Washington mean time, it is convenient to take first the computed time of *apparent* conjunction, or some conjectural time near it. For this time find

$$h = H + \mu \quad x = t x' \quad y = Y + t y'.$$

A nearer approach to the time of either phase can be obtained by the following formulæ :

$$\begin{aligned}
 A \sin B &= E \sin \varphi & u &= F \cos \varphi \sin (h - \lambda) \\
 A \cos B &= F \cos \varphi \cos (h - \lambda)^* & v &= A \sin (B - \delta') \\
 & & u' &= \mu' A \cos B \\
 & & v' &= \mu' u \sin \delta'
 \end{aligned}$$

or, with other auxiliaries than  $A$  and  $B$ ,

$$\begin{aligned}
 b &= F \cos \varphi \cos (h - \lambda) & u' &= b \mu' \\
 v &= E \sin \varphi \cos \delta' - b \sin \delta'. \\
 m \sin M &= x - u & n \sin N &= x' - u' \\
 m \cos M &= y - v & n \cos N &= y' - v' \\
 (\text{Burckhardt.}) \quad k &= .27227 & \log k &= 9.43500 \\
 \cos \psi &= \frac{m \sin (M - N)}{k} & \psi &< 180^\circ
 \end{aligned}$$

	For Immersion.	For Emersion.
In hours,	$t_1 = -\frac{m \cos (M - N)}{n} - \frac{k \sin \psi}{n}$	$t_2 = -\frac{m \cos (M - N)}{n} + \frac{k \sin \psi}{n}$
Wash. mean time, $T_1 = T + t_1$		$T_2 = T + t_2$
Local " " $T_1 - \lambda$		$T_2 - \lambda$

Assuming now  $T_1 = \delta + t + t_1$  for the Immersion, or  $T_2 = \delta + t + t_2$  for the Emersion, as the Washington time instead of  $T$ , and recomputing, we can obtain\* nearer approximations to the times of these phenomena. But the first operation will give the times usually within one or two minutes, which is sufficiently accurate for watching for an immersion. For an emersion a more accurate knowledge is desirable; and for this purpose it will often be sufficient to substitute  $(h_2 - \lambda) = (h - \lambda + \frac{1}{2} \mu_2)$  for  $(h - \lambda)$  in the computation of  $u'$  and  $v'$ , and, using the same  $m$  and  $M$  as before, recompute  $n$ ,  $N$ ,  $\psi$  and  $t_2$ , a new correction to be added to  $T_2$ .

If  $\log. m \sin (M - N) = 9.4350$  nearly, a recalculation will generally be necessary to determine whether numerically,  $\cos \psi < 1$ , or  $\cos \psi > 1$ . In the latter case the impossible value of  $\cos \psi$  indicates that an occultation at the given place is impossible, except the computed distance from the moon's limb is within the errors of the Ephemeris of the moon and star.

In such cases of near approach to the moon's limb, we may take  $\psi = 0^\circ$ , or  $180^\circ$ , according as  $m \sin (M - N)$  is +, or -; and for finding the time,

$$t = -\frac{m \cos (M - N)}{n}$$

The distance from the moon's limb is then

$$\pi (m \sin (M - N) - k),$$

disregarding the sign of  $m \sin (M - N)$ ; or, allowing for the augmentation of the semi-diameter,

$$\pi (m \sin (M - N) - k) (1 + z \sin \pi),$$

$$z = A \cos (B - \delta').$$

where

Having found satisfactorily the times of Immersion and Emersion, and therefore  $N$  and  $\psi$  in each case, we have as the angle from the *North point* of the moon's limb and reckoned towards the *West*,

$$\begin{aligned}
 Q &= 90^\circ - N - \psi & \text{for an immersion} \\
 Q &= 90^\circ - N + \psi & \text{for an emersion,}
 \end{aligned}$$

\* If  $(h - \lambda)$  be restricted to values numerically less than  $12^h$ , or  $180^\circ$ ,  $B$  may be taken in the same quadrant with  $(h - \lambda)$ , and have the same sign as the latitude. For a place where many occultations are observed, tables of  $A$ ,  $B$ ,  $u$  and  $u'$  for different values of  $(h - \lambda)$ , or of  $E \sin \varphi \cos \delta'$  for different declinations, would be convenient.

and, taking

$$c \sin C = u + t u'$$

$$c \cos C = v + t v',$$

in which the last value of  $t$  for the particular phase is properly used, we have as the angle from the *Vertex* of the moon's limb, or that point which is nearest the zenith,

$$V = Q + C$$

also reckoned towards the *West*.

For the image as seen through an inverting telescope, add to these angles  $180^\circ$ .

As a check on the accuracy of the work, we might recompute with the last determined time of immersion, or of emersion,  $u$ ,  $v$ ,  $x$ , and  $y$ , and we should have for either,

$$(x-u)^2 + (y-v)^2 = k^2 = 0.07413$$

$$\text{or,} \quad \log m = \log k = 9.4350$$

as the condition of the phenomenon:

Or, using the last computed values of the several quantities,

$$[(x-u) + t(x'-u')]^2 + [(y-v) + t(y'-v')]^2 = k^2 = 0.07413.$$

Greater values than these indicate that the computed time of immersion is too early, and of emersion too late, by a quantity proportional to the difference.

As an example, suppose it is required to find the times of immersion and emersion of  $\mu$  Ceti, February 17, 1869, at Chicago, Illinois, for which,

$$\phi = +41^\circ 53'$$

$$\lambda = 0^h 42^m 19^s.$$

The data for the computation are given on page 420. We see in advance that  $\phi$  is between the limiting latitudes; that  $(\phi - \lambda)$  is about  $7\frac{1}{4}^h$ , or two hours after sunset; and that  $(H - \lambda)$  is about  $2\frac{1}{4}^h$ , or four hours less than the star's hour angle at setting.

The constants for the place are:

1. $\sin \phi$	= 9.8245	1. $\cos \phi$	= 9.8719		
$\log E$	= 9.9977	$\log F$	= 0.0006	$\log \mu'$	= 9.4192
(1) $\log. E \sin \phi$	= 9.8222	(2) $\log. F \cos \phi$	= 9.8725	(3) $\log. \mu' F \cos \phi$	= 9.2917

From page 420, for time of geocentric conjunction:

$\phi$	= $8^h 7^m.3$	$\phi - \lambda$	= $7^h 25^m.0$	$X$	= 0
$H$	= $+3^h 21^m 36^s$	$H - \lambda$	= $+2^h 39^m 17^s = +39^\circ 49'$	$Y$	= $+ .3714$
1. $\sin \phi'$	= 9.2202	$\phi' = +9^\circ 33'.5$		$x'$	= $+ .5314$
1. $\cos \phi'$	= 9.9939			$y'$	= $+ .1663$

First approximation to time of apparent conjunction:

(2) $\log. F \cos \phi$	= 9.872	(3) $\log. \mu' F \cos \phi$	= 9.292	$x'$	= $+ .531$
(4) 1. $\sin (H - \lambda)$	= 9.806	(5) 1. $\cos (H - \lambda)$	= 9.885	$u'$	= $+ .150$
(6) = (2) + (4) $\log u$	= 9.678	(7) = (3) + (5) $\log u'$	= 9.177	$x' - u'$	= $+ .381$
(8) $\log (x' - u')$	= 9.581			$\phi$	= $8^h 7^m.3$

$$\log (t) = 0.098$$

$$(t) = +1^h.25 = +1^h 15'$$

Washington mean time,

$$(T) = \phi + (t) = 9^h 22.3$$

For this time:

(9) $\mu' = +1^h 15^m 12^s$	(25)	$X$	= 0
(10) $H - \lambda = +2^h 39^m 17^s$	(26)	$1.25 \times .5314 = (t) x'$	= $+ .6642$
(11) = (9) + (10) $\lambda - \lambda = +3^h 54^m 29^s = 58^\circ 37'$	(27)	$Y = + .3714$	
(12) 1. $\sin (\lambda - \lambda) = 9.9313$	(28)	$1.25 \times .1663 = (t) y'$	= $+ .2079$
(13) = (2) $\log. F \cos \phi = 9.8725$	(29) = (25) + (26)	$x = + .6642$	
(14) 1. $\cos (\lambda - \lambda) = 9.7166$	(30)	$u = + .6365$	
(15) 1. $\sin \phi' = 9.2202$	(31) = (27) + (28)	$y = + .5793$	
(16) = (12) + (13) $\log u = 9.8038$	(32)	$v = + .5903$	
(17) $\log \mu' = 9.4192$	(33) = (29) - (30)	$m \sin M = x - u = + .0277$	
(18) = (13) + (14) $\log. A \cos B = 9.5891$	(34) = (31) - (32)	$m \cos M = y - v = -.0110$	
(19) = (1) $\log. A \sin B = 9.8222$	(35)	$x' = + .5314$	
(20) = (19) - (18) 1. $\tan B = 0.2331$	(36)	$u' = + .1019$	
(21) 1. $\sin B = 9.9362$	(37)	$y' = + .1663$	

$$\begin{aligned}(22)=(19)-(21) \quad \log A &= 9.8860 \\ (23) \quad l. \sin (B-d') &= 9.8851 \\ (24)=(22)+(23) \quad \log v &= 9.7711\end{aligned}$$

$$\begin{aligned}(41) \quad \log. m \sin M &= 8.442 \\ (42) \quad \log. m \cos M &= 8.041n \\ (43)=(41)-(42) \quad l. \tan M &= 0.401n \quad M=+111 \quad 40 \\ (44) \quad l. \cos M &= 9.567n \quad N=+72 \quad 7 \\ (45)=(42)-(44) \quad \log m &= 8.474 \quad M-N=+39 \quad 33 \\ (46) \quad \log \frac{1}{k} &= 0.565\end{aligned}$$

$$\begin{aligned}(47) \quad l. \sin (M-N) &= 9.834 \quad 90^\circ-N=+17 \quad 52 \\ (48)=(45)+(46)+(47) \quad l. \cos \psi &= 8.843 \quad \psi=\pm 96 \quad 0\end{aligned}$$

$$\begin{aligned}\text{Angle from } N. \text{ point at } 1m. \quad Q_1 &= 292^\circ \\ \text{“ “ “ at Em.} \quad Q_2 &= 104\end{aligned}$$

$$-\frac{m}{n} \cos (M-N) = -0^h.051$$

$$\pm \frac{k}{n} \sin \psi = \pm 0^h.602$$

$$\text{For Im.} \quad t_1 = -0^h.653 = -0 \quad 39.2$$

$$(T) = 9 \quad 22.3$$

Washington mean time of Im.

$$T_1 = 8 \quad 43.1$$

$$\lambda = 0 \quad 42.3$$

Chicago mean time of Im.

$$T_1 - \lambda = 8 \quad 0.8$$

$$\begin{aligned}(38) \quad v' &= +.0277 \\ (39)=(35)-(36) \quad n \sin N &= x' - u' = +.4295 \\ (40)=(37)-(38) \quad n \cos N &= y' - v' = +.1386\end{aligned}$$

$$\begin{aligned}(49) \quad \log. n \sin N &= 9.6330 \\ (50) \quad \log. n \cos N &= 9.1418\end{aligned}$$

$$(51)=(49)-(50) \quad l. \tan N = 0.4912$$

$$(52) \quad l. \sin N = 9.9785$$

$$(53)=(52)-(49) \quad \log \frac{1}{n} = 0.3455$$

$$(54)=(45) \quad \log m = 8.474$$

$$(55) \quad l. \cos (M-N) = 9.887$$

$$(56) \quad l. \sin \psi = 9.9989$$

$$(57) \quad \log k = 9.4350$$

$$(58)=(53)+(54)+ (55) \quad \log. \frac{m}{n} \cos (M-N) = 8.706$$

$$(59)=(53)+(56)+ (57) \quad \log \frac{k}{n} \sin \psi = 9.7794$$

$$\text{For Em.} \quad t_2 = +0.551 = +0 \quad 33.1$$

$$(T) = 9 \quad 22.3$$

$$\text{of Em.} \quad T_2 = 9 \quad 55.4$$

$$\lambda = 0 \quad 42.3$$

$$T_2 - \lambda = 9 \quad 13.1$$

Assuming these times and revising the computation, we obtain :

$$\begin{aligned}\text{Chicago mean time} \quad \text{For Im.} \quad t'_1 &= -0 \quad 1.1 \\ \text{Angle from } N. \text{ point} \quad \text{“} \quad T'_1 - \lambda &= 7 \quad 59.7 \\ \text{“} \quad Q_1 &= 292^\circ.6\end{aligned}$$

$$c \sin C_1 = u + t'_1 \quad u' = +.558$$

$$c \cos C_1 = v + t'_1 \quad v' = +.572$$

$$C_1 = 44^\circ.2$$

and by the Traverse Table,\*

$$\text{Angle from Vertex} \quad V_1 = Q_1 + C_1 = 33^\circ.8$$

We shall also find in each case as the test,

$$(x-u)^2 + (y-v)^2 = 0.0741$$

very nearly.

Instead, however, of an entire revision of the work, a partial revision may be made like the following for correcting the time of emersion :

$$\begin{aligned}(9) \quad \frac{1}{2} \mu'_3 &= +0 \quad 16 \quad 33 \\ (10) \quad h - \lambda &= +3 \quad 54 \quad 29\end{aligned}$$

$$(11)=(9)+(10) \quad h_2 - \lambda = +4 \quad 11 \quad 2 = 62 \quad 45$$

$$(12) \quad l. \sin (h_2 - \lambda) = 9.9489$$

$$(13) \quad \log F \cos \phi = 9.8725$$

$$(14) \quad l. \cos (h_2 - \lambda) = 9.6606$$

$$(15) \quad l. \sin d' = 9.2202$$

$$(16)=(12)+(13) \quad \log u = 9.8214 \quad \log v' = 8.4608$$

$$(17) \quad \log \mu' = 9.4192$$

$$(18)=(13)+(14) \quad \log A \cos B = 9.5331 \quad \log u' = 8.9523$$

$$(45) \quad 1st \text{ Comp'n} \quad \log m = 8.474 \quad M = +111^\circ \quad 40'$$

$$(46) \quad \log \frac{1}{k} = 0.565 \quad N = +72 \quad 43$$

$$(47) \quad l. \sin (M-N) = 9.798 \quad M-N = +38 \quad 57$$

$$(48)=(45)+(46)+(47) \quad l. \cos \psi = 8.837 \quad 90^\circ-N = +17 \quad 17$$

$$\psi = +86 \quad 4$$

$$\text{Angle from } N. \text{ point at Em.} \quad Q_2 = +103 \quad 21$$

$$(35) \quad x' = +.5314$$

$$(36) \quad u' = +.0896$$

$$(37) \quad y' = +.1663$$

$$(38) \quad v' = +.0289$$

$$(39)=(35)+(36) \quad n \sin N = x' - u' = +.4418$$

$$(40)=(37)+(38) \quad n \cos N = y' - v' = +.1374$$

$$(49) \quad \log n \sin N = 9.6452$$

$$(50) \quad \log n \cos N = 9.1380$$

$$(51)=(49)-(50) \quad l. \tan N = 0.5072$$

$$(52) \quad l. \sin N = 9.9800$$

$$(53)=(52)-(49) \quad \log \frac{1}{n} = 0.3348$$

$$(54)=(45) \quad \log m = 8.474$$

$$(55) \quad l. \cos (M-N) = 9.891$$

$$(56) \quad l. \sin \psi = 9.9990$$

$$(57) \quad \log k = 9.4350$$

$$(58)=(53)+(54)+(55) \quad \log. \frac{m}{n} \cos (M-N) = 8.700$$

$$(59)=(53)+(56)+(57) \quad \log \frac{k}{n} \sin \psi = 9.7638$$

\* A large portion of this computation may be made by the Traverse Table instead of logarithms.

$$\begin{aligned}
 -\frac{m}{\pi} \cos (M-N) &= -0.050 \\
 +\frac{k}{\pi} \sin \psi &= +0.587 \\
 t_2 &= +0.537 = +0^{\text{h}} 32.2^{\text{m}} \\
 (T) &= 9^{\text{h}} 22.3^{\text{m}} \\
 \text{Washington mean time} \quad T_2 &= 9^{\text{h}} 54.5^{\text{m}} \\
 \text{Chicago} \quad \text{"} \quad \text{"} \quad T_2 - \lambda &= 9^{\text{h}} 12.2^{\text{m}}
 \end{aligned}$$

Pages 455–457 contain a list of such occultations and near approaches as will be visible at Washington during the year 1869. For the latter, the time of nearest approach, the nearest point of the moon's limb, and the distance of the star from the moon's limb, are stated.

At the end of the Appendix will be found a list of most of the occultations, which will be visible between  $30^\circ$  and  $45^\circ$  north latitude, and  $1^{\text{h}} 30^{\text{m}}$  and  $3^{\text{h}}$  longitude west from Washington during the years 1868 and 1869. The times of immersion and emersion in Washington mean time, and the angle from the vertex at emersion, are given for each  $5^\circ$  of latitude and each  $30^{\text{m}}$  of longitude between the above limits, and can easily be found by interpolation for intermediate points.

*Jupiter's Satellites*, pages 458–490.—These pages contain for the several Satellites—

1. The Washington mean times of the occultations, eclipses, transits and transits of shadows, arranged in the order of time. W, after a phase, indicates such as are visible at Washington, or which occur when the sun is more than  $8^\circ$  below and Jupiter more than  $8^\circ$  above the horizon of that place.

2. A diagram for each month constructed for the eclipse which occurs nearest the middle of the month, showing the phases of the eclipse for an inverting telescope. The stars indicate the points of disappearance and reappearance, distinguished by *d* and *r*. The space between them shows the position of the shadow of the planet.

3. Washington mean time of geocentric superior conjunction, arranged for each planet separately.

4. The rectangular coördinates *x'* and *y'* for successive times reckoned from the next preceding superior conjunction, computed for a constant major axis and maximum minor axis of the apparent ellipse described by the satellite as seen from the sun at its mean distance from the planet.

5. The *factors* by which *x'* and *y'* are to be multiplied to obtain the actual coördinates *x* and *y* for the apparent ellipse, as seen from the earth at any date; the inclination *p* of the minor axis to the circle of declination, reckoned from the *north*, positive towards the *east*; and the actual coördinates *x* and *y* at the times of eclipse of each satellite.

The coördinates are referred to the centre of the primary and the major and minor axis of the ellipse described by the satellite, and are expressed in seconds of arc. *x* is positive when on the *east* side of the planet; *y* is positive when *north*. By means of them the configurations of the satellite can be found at any time.

The *Elements of Saturn's Ring*, page 491, give the *apparent* magnitude and position of its several components for each 20 days. The *apparent Discs* of Venus and Mars are given on the same page for the 15th of each month.

The *Phenomena*, pages 492, 493, include the times of conjunction, opposition and quadrature, perihelion and aphelion, stationary points, and conjunction in right ascension with the moon, of the principal planets.

The *Positions of the Principal Observatories* are given on pages 494, 495.

In the Appendix will be found tables of corrections of the Ephemerides of Venus and Mars on pages 218-229, to adapt them to the adopted elements; a table of reductions of the mean places of the Standard Stars to those adopted in the American Ephemeris for 1870; and an Ephemeris of Neptune for the years 1866 to 1869, computed from the Tables of Professor NEWCOMB.

# APPENDIX.





## CONSTRUCTION OF THE ASTRONOMICAL AND NAUTICAL EPHEMERIDES FOR 1869.

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THE Precession of the Equinoxes, the Mean Obliquity of the Ecliptic, and the Constant of Aberration (p. 250) are taken from STRUVE and PETERS. They are:

$$\begin{aligned}\text{Precession}^* &= 50''.2411 + 0''.0002268 t, \\ \text{Obliquity}^\dagger &= 23^\circ 27' 54''.22 - 0''.4645 t - 0''.0000014 t^2, \\ \text{Aberration}^\ddagger &= 20''.4451 \pm 0''.0111,\end{aligned}$$

in which  $t$  is the number of years after 1800.

The Nutation of the Apparent Obliquity and the Equation of the Equinoxes are computed from PETERS' formulæ given in his *Numerus Constans Nutationis*, pp. 46-48, and reprinted in the volume of this Ephemeris for 1855. These quantities have been used in all computations relating to the Fixed Stars.

The General Constants for Star Reduction are computed from tables adapted to the formulæ given on page 260.

In the Ephemerides of the Sun, Moon, and Planets, the Obliquity of the Ecliptic and the Nutation of HANSEN and OLUFSEN's *Tables du Soleil* have been used. The Aberration in these tables,  $20''.255$ , has been used in the Ephemeris of the Sun. The Mean Obliquity exceeds that of PETERS by  $0''.37$ .

The Mean Places of 48 Northern Circumpolar Stars, and the Mean Right Ascensions of 128 Time Stars, have been taken from the *Standard Mean Right Ascensions of Circumpolar and Time Stars, prepared for the use of the U. S. Coast Survey* by Dr. B. A. GOULD, Washington, 1862.

The Mean Places of 4 Southern Circumpolar Stars are derived from the *British Nautical Almanac* for 1848. The authorities for the Mean Declinations of the 128 Time Stars and the Mean Places of the remaining 18 Stars are stated in the Appendix to the *American Ephemeris and Nautical Almanac* for 1865.

In the nomenclature of the Fixed Stars, (H) signifies that HEVELIUS's number, (B) that BODE's notation has been used. Duplicate notations have been added in a few cases. The magnitudes, except of stars south of  $-40^\circ$  dec., are ARGELANDER's.

The reductions from the Mean to the Apparent Places of the Stars contained in WOLFER's *Tabula Reductionum* have been derived from that work; except that generally the proper motions derived from the authorities referred to in the Ephemeris for 1865 have been employed, and for Polaris  $-0''.07 \tau^2$  has been applied, and the term depending on  $\zeta - \Gamma'$  omitted.

The reductions of the remaining 154 stars have been taken from tables similar to those of WOLFER's. They include the terms of the formulæ on pages 260 and 504, so far as sensible, except those depending on the moon's longitude. The terms depending on  $2 \zeta$  have, however, been applied to the four stars whose places are given for every day. The values of these terms for seven circumpolar stars, computed for 1870.0, are given in the Table IV. of this Appendix.

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\* PETERS' *Numerus Constans Nutationis*, p. 71.  
† STRUVE's *Constant de l'Aberration*, p. 47.

† Ibid., pp. 66 and 71.

## APPENDIX.

The right ascension of Sirius includes the term given by PETERS,\*

$$q = 0^{\circ}.127 + 0^{\circ}.00050 (t - 1800) + 0^{\circ}.171 \sin (u + 77^{\circ} 44')$$

in which  $u$ , the eccentric anomaly from the inferior apsis, is found by the formula

$$u - e \sin u = n (t - T),$$

from the elements

$T = 1791.431$ , passage through the inferior apsis,

$e = 0.7994$ , the eccentricity,

$n = 7^{\circ}.1865$ , mean annual motion in orbit,

$50^{\circ}.093$ , period of revolution.

The Mean Places of such of the Moon-culminating Stars as are not found in the list of standard stars, have been taken in order of preference from the *Almanac Catalogue of Zodiacal Stars printed for the use of the American Ephemeris and Nautical Almanac*, Washington, 1864; the *Greenwich Twelve-Year Catalogue*; and the *Catalogue of the British Association*.

The Ephemeris of the Sun is constructed from HANSEN and OLUFSEN's *Tables du Soleil*, Copenhagen, 1853. The Sun's rectangular equatorial coördinates have been computed from the longitudes and latitudes by the following formulæ:

$$X = R \cos \lambda$$

$$Y = R \sin \lambda \cos \omega - 19.3 R \delta$$

$$Z = R \sin \lambda \sin \omega + 44.5 R \delta$$

$$X' = X + Y \sec \omega \Delta \lambda$$

$$Y' = Y - X \cos \omega \Delta \lambda + Z \Delta \omega - 9.4 \tau R \sin (\odot + 187^{\circ})$$

$$Z' = Z - X \sin \omega \Delta \lambda - Y \Delta \omega + 21.7 \tau R \sin (\odot + 187^{\circ})$$

in which  $\lambda$ ,  $\delta$  and  $\omega$  are referred to the equinox and ecliptic of the date;  $\Delta \lambda$  is the reduction of longitude for precession and nutation from Jan. 0;  $\Delta \omega$  the reduction of the mean to the apparent obliquity;  $\tau$  the part of the year since Jan. 0; and the numerical coefficients are in units of the 7th place.

The Sun's Horizontal Parallax at the Earth's mean distance has been taken from ENCKE's discussion of the Transits of Venus in 1761 and 1769, equal to  $8''.5776$ . Later discussions give a value  $0''.3$  greater. The Sun's Semidiameter at the Earth's mean distance has been taken as  $16' 2''$ .

The Ephemeris of the Moon has been constructed from PEIRCE's *Tables of the Moon*, 2d edition, Washington, 1865. They include the *Tables of the Moon's Parallax* constructed from WALKER's and ADAMS's formulæ.

The Semidiameter of the Moon has been computed from the Moon's Horizontal Parallax by the formula,

$$S = .272274 \pi + 2''.5.$$

A semidiameter  $2''.5$  less is found to be better adapted for the computation of eclipses and occultations.

The Ephemeris of Mercury has been derived from the Tables of Prof. WINLOCK, which are based on the theory of LE VERBIER, published in the *Additions to the Connaissance des Temps* for 1848.

The Ephemeris of Venus has been derived from manuscript Tables, constructed from LINDENAU's Tables, in a form similar to that adopted for the Lunar Tables: applying AIRY's Long Equation and the corrections proceeding from the discussion, by the method

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\* *Astronomische Nachrichten*, Nr. 748, "Elemente V."

## CONSTRUCTION OF THE ALMANAC.

of Least Squares, of Mr. HUGH BREEN's results contained in his paper on the *Corrections of LINDENAU'S Elements of the Orbit of Venus*, &c., published in the *Memoirs of the Royal Astronomical Society*, Vol. XVIII.; and adopting the secular variations of the elements from LE VERRIER'S *Memoir on the Determination of the Secular Inequalities of the Planets*, which appeared in the *Connaissance des Temps* for the year 1844. The following are the corresponding corrected elements, and annual variations for Washington, 1855.0:

$$\begin{aligned} L &= 289^{\circ} 51' 53.5'' + 2106691''.706 t. \\ \pi &= 129^{\circ} 32' 59.6'' + 49''.57459 t. \\ Q &= 75^{\circ} 23' 27.3'' + 32''.88424 t. \\ i &= 3^{\circ} 23' 34.6'' + 0''.04363 t. \\ e &= 1410''.6847 - 0''.11157 t. \\ n &= 2106641''.438 \\ a &= 0.7233323 \end{aligned}$$

The Ephemeris of Mars is derived from manuscript Tables constructed from LINDENAU'S Tables in the same manner as the Tables of Venus. Mr. HUGH BREEN's results contained in his paper *On the Corrections of LINDENAU'S Elements of Mars*, published in the *Memoirs of the Royal Astronomical Society*, Vol. XX., have also been discussed and applied; and LE VERRIER'S secular variations of the elements are likewise adopted. The following are the corresponding corrected elements, and secular variations for Washington, 1855.0:

$$\begin{aligned} L &= 320^{\circ} 13' 33.87'' + 689101''.1527 t. \\ \pi &= 333^{\circ} 23' 17.84'' + 65''.9990 t. \\ Q &= 48^{\circ} 25' 55.29'' + 27''.6997 t. \\ i &= 1^{\circ} 51' 2.20'' - 0''.02141 t. \\ e &= 19238''.75 + 0''.18549 t. \\ n &= 689050''.8927 \\ a &= 1.5236915 \end{aligned}$$

The Ephemeris of Jupiter is derived from manuscript Tables constructed from BOUVARD'S Tables, with such changes as were required to make them correspond more nearly to the formulæ.

The Ephemeris of Saturn is derived from BOUVARD'S Tables. The perturbations produced by Jupiter, and the change of the Great Inequality since 1840, have been increased by  $\frac{1}{50}$  of their value. ADAMS'S Table in the *British Nautical Almanac* for 1851 has been substituted for BOUVARD'S Table XLII. The following corrections of the elements for 1855.0 have also been introduced:

corr. mean long.	= + 4''.9
corr. long. of node	= - 143''.0
corr. inclination	= - 5''.7 + 0''.0149 t.

The Ephemeris of Uranus is derived from the elliptical portion of BOUVARD'S Tables, with LE VERRIER'S corrections and perturbations caused by Jupiter and Saturn, contained in his *Recherches sur les Mouvements de la Planète Herschel (dite Uranus)*, published in the *Connaissance des Temps* for 1849, and also PEIRCE'S corrections and perturbations arising from the influence of Neptune.

The Ephemeris of Neptune is derived from PEIRCE'S theory and WALKER'S orbit.

An Ephemeris for 1866-9, derived from Prof. NEWCOMB'S *Tables of Neptune*, Washington, 1866, is given on pages 21-27 of this Appendix.

## APPENDIX.

The eclipses and elongations of Jupiter's Satellites are computed from DAMOISEAU's Tables.

The semidiameters of the Planets are computed from the following values :

	Semidiameter.	Log Dist.	Authority.
Mercury	3.34	0.00	LE VERRIER, <i>Theory of Mercury</i> .
Venus	$8.546 \pm 0.086$	0.00	
Mars (polar)	$2.842 \pm 0.057$	0.25	PEIRCE, from the Washington Observations of 1845 and 1846, made with the mural circle.
Jupiter (polar)*	$18.78 \pm 0.067$	0.70	
Saturn (polar)	$8.77 \pm 0.039$	0.95	
Uranus	$1.68 \pm 0.3$	1.30	
Jupiter (equat.)	20.00	0.70	
Saturn (equat.)	9.38	0.95	

To correspond to the apparent semidiameters observed with the Washington mural circle, all the semidiameters, except those of Mercury, computed from these values, must be increased by the constant quantity,  $0''.57$ .

The apparent elements of Saturn's Rings are computed from BESSEL's data, except those for Bond's dusky ring.

The Tables for the eclipses of the sun are adapted to the modification of BESSEL's formulæ, suggested by T. HENRY SAFFORD, jr. The formulæ are given in PEIRCE's *Spherical Astronomy* and CHAUVENET's *Spherical and Practical Astronomy*, Vol. I.

The elements for occultations of stars by the moon are adapted to BESSEL's method in the *Astronomische Nachrichten*, Vol. VII., and the *Berliner Astronomisches Jahrbuch* for 1831. The formulæ are also to be found in CHAUVENET's *Astronomy*.

The Heliocentric Coördinates of the Planets are given for the computation of perturbations, and the following are the values of the masses, that of the Sun being unity :

Mercury	$\frac{1}{4865751}$	ENCKE, <i>A. N.</i> , No. 443.
Venus	$\frac{1}{390000}$	LE VERRIER, <i>Théor. de Merc.</i> , p. 115.
The Earth	$\frac{1}{354936}$	LE VERRIER, <i>Théor. de Merc.</i> , p. 26.
Mars	$\frac{1}{2630637}$	BURCKHARDT, <i>Conn. des Temps</i> , 1816, p. 343.
Jupiter	$\frac{1}{1047.879 \pm 0.235}$	BESSEL, <i>Die Masse des Jupiter</i> , p. 64
Saturn	$\frac{1}{3501.6}$	BESSEL, <i>Comptes Rendus</i> , 1841.
Uranus	$\frac{1}{24905}$	LAMONT, <i>Mem. Ast. Soc.</i> , Vol. XI., p. 54.
Neptune	$\frac{1}{18780}$	PEIRCE, <i>Am. Ac. Proc.</i> , Vol. I., p. 333.

The intervals of original computation have in all cases been made sufficiently small to authorize the use of the differences as a check of the accuracy of the work. The results have also been tested, in various portions, by means of duplicate computations. The proofs from the electrotype plates have been thoroughly examined by an independent series of differences. And it is believed that, in every respect, that system has been adopted in which accuracy was most likely to be secured.

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\* In the volumes for 1858 to 1869 inclusive 19''.19, from the Appendix for 1855, has been used for the Washington Ephemeris.

# CONSTRUCTION OF THE ALMANAC.

The principal computations of the Ephemeris have been distributed in the following manner :

The Sun has been computed by Mr. EASTWOOD; the Ephemeris of the Moon and the Lunar Distances by Professor RUNKLE, Mr. WRIGHT, and Mr. FERREL. Mercury has been computed by Mr. ABSTIN, Venus by Miss MITCHELL, Mars by Mr. EASTWOOD and Mr. OLIVER, Jupiter by Professor KENDALL, Saturn by Professor VAN VLECK, Uranus by Mr. FERREL, and Neptune by Professor KENDALL. The Fixed Stars and the General Constants for Reduction have been computed by Mr. G. W. HILL, and the Occultations by Mr. DOWNES and Mr. WIESSNER. The Eclipses have been computed and the Charts projected by Mr. WRIGHT. The Ephemeris of Neptune from NEWCOMB's Tables has been prepared by Mr. WIESSNER; and the Occultations visible West of the Mississippi by Mr. H. B. HILL.

## *Corrections to be applied to the Ephemerides of Venus and Mars, Pages 218-229.*

1869.		Venus.		Mars.		1869.		Venus.		Mars.	
		$\Delta \alpha$	$\Delta \delta$	$\Delta \alpha$	$\Delta \delta$			$\Delta \alpha$	$\Delta \delta$	$\Delta \alpha$	$\Delta \delta$
Jan.	1	+0.02	+0.4	+0.04	—0.5	July	10	—0.05	—0.1	—0.04	—0.3
	11	.00	.4	.03	.3		20	.05	+ .1	.05	.2
	21	.00	.6	.03	.2		30	.04	.3	.05	.1
	31	— .02	.7	.03	.6	Aug.	9	— .02	.6	.04	.1
Feb.	10	.02	.6	.03	.5		19	+ .01	.6	.04	.1
	20	.02	.4	.03	.6		29	.02	.6	.05	.1
March	2	.02	.3	.01	.3	Sept.	8	.03	.5	— .04	.1
	12	.02	.2	.02	.3		18	.06	.5	+ .02	— .1
	22	— .01	+ .2	.04	.4		28	.08	.4	.03	.0
April	1	.00	.0	.04	.6	Oct.	8	.10	.3	.04	+ .1
	11	+ .01	.0	.03	.6		18	.12	.3	.03	.1
	21	.02	— .1	.03	.5		28	.13	.3	.03	.2
May	1	.02	.3	.02	.4	Nov.	7	.12	+ .2	.02	.2
	11	+ .02	.5	.02	.3		17	.12	.0	.02	.2
	21	— .01	.6	.03	.3		27	.10	— .4	.02	.2
	31	.01	.6	.03	.2	Dec.	7	.09	.8	.02	.2
June	10	.02	.6	.03	.2		17	.09	1.2	.02	+ .1
	20	.03	.5	.04	.2		27	+ .04	1.7	+ .01	.0
	30	—0.04	—0.3	+0.04	—0.2		37	0.03	—2.4	0.00	—0.1

# APPENDIX.

## REDUCTIONS OF THE MEAN PLACES OF THE STARS IN THE AMERICAN EPHEMERIS, 1865-69, TO THOSE ADOPTED IN THE EPHEMERIS FOR 1870.

[*t* is reckoned from 1865.0.]

### IN RIGHT ASCENSION.

$\beta$ Hydri	—0.221	—0.0188 <i>t</i>	$\alpha^2$ Centauri	—0.025	—0.002 <i>t</i>
$\epsilon$ Piscium	—0.050	—0.0010 <i>t</i>	$\beta^1$ Scorpii	+0.042	+0.0002 <i>t</i>
$\alpha$ Ursæ Minoris	+1.113	+0.0512 <i>t</i>	$\eta$ Draconis	—0.519	—0.0196 <i>t</i>
$\eta$ Piscium	+0.005	—0.0005 <i>t</i>	$\zeta$ Ophiuchi	—0.023	—0.0003 <i>t</i>
$\alpha$ Persei	—0.022	—0.0002 <i>t</i>	$\beta$ Draconis	+0.024	+0.0003 <i>t</i>
$\alpha$ Columbæ	—0.033	—0.0013 <i>t</i>	$\delta$ Ursæ Minoris	—0.084	—0.0022 <i>t</i>
51 Cephei	+0.483	+0.0332 <i>t</i>	$d$ Sagittarii	—0.050	—0.0010 <i>t</i>
$\mu$ Leonis	+0.027	+0.0007 <i>t</i>	$\tau$ Aquilæ	—0.073	—0.0013 <i>t</i>
$l$ Leonis	+0.040	0.0000 <i>t</i>	$\lambda$ Ursæ Minoris	+0.537	—0.0048 <i>t</i>
$o$ Virginis	—0.049	—0.0009 <i>t</i>	Groombridge 3241	+0.210	+0.0050 <i>t</i>
$\beta$ Chamæleontis	—0.007	—0.0002 <i>t</i>	61 <sup>1</sup> Cygni	+0.287	+0.0138 <i>t</i>
$\alpha^1$ Crucis	—0.005	—0.0004 <i>t</i>	1 Pegasi	—0.010	—0.0010 <i>t</i>
$\beta$ Corvi	+0.079	+0.0029 <i>t</i>	$\mu$ Capricorni	—0.035	—0.0015 <i>t</i>
$\beta$ Centauri	—0.003	0.0000 <i>t</i>	$\lambda$ Aquarii	+0.025	+0.0005 <i>t</i>

### IN DECLINATION.

$\alpha$ Andromedæ	—0.23	—0.005 <i>t</i>	$\gamma$ Geminorum	+0.76	+0.013 <i>t</i>
$\gamma$ Pegasi	+0.38	+0.012 <i>t</i>	51 Cephei	—0.40	—0.048 <i>t</i>
$\beta$ Hydri	—0.03	.000 <i>t</i>	$\epsilon$ Canis Majoris	+1.80	+0.024 <i>t</i>
$\alpha$ Cassiopeæ	—0.48	—0.006 <i>t</i>	$\delta$ Canis Majoris	+0.94	+0.027 <i>t</i>
$\beta$ Ceti	+1.11	+0.019 <i>t</i>	$\delta$ Geminorum	+1.02	+0.029 <i>t</i>
$\epsilon$ Piscium	+0.61	+0.025 <i>t</i>	$\beta$ Geminorum	+0.63	+0.017 <i>t</i>
$\alpha$ Ursæ Minoris	—0.15	—0.005 <i>t</i>	$\phi$ Geminorum	+1.28	+0.036 <i>t</i>
$\theta^1$ Ceti	+1.42	+0.027 <i>t</i>	15 Argus	+0.89	+0.013 <i>t</i>
$\eta$ Piscium	+1.05	+0.018 <i>t</i>	$\epsilon$ Hydre	—0.62	+0.018 <i>t</i>
$o$ Piscium	+0.41	+0.028 <i>t</i>	$\iota$ Ursæ Majoris	—0.13	+0.014 <i>t</i>
$\beta$ Arietis	+0.74	+0.016 <i>t</i>	$\kappa$ Cancri	+1.16	+0.031 <i>t</i>
$\alpha$ Arietis	+0.11	+0.003 <i>t</i>	$\alpha$ Hydre	+0.15	+0.006 <i>t</i>
$\delta$ Ceti	—0.20	+0.029 <i>t</i>	$\theta$ Ursæ Majoris	+0.47	+0.015 <i>t</i>
$\gamma$ Ceti	+1.73	+0.037 <i>t</i>	$\epsilon$ Leonis	+0.83	+0.014 <i>t</i>
$\alpha$ Ceti	+0.40	+0.014 <i>t</i>	$\mu$ Leonis	+0.34	+0.014 <i>t</i>
$\zeta$ Arietis	+0.47	+0.013 <i>t</i>	$\alpha$ Leonis	+0.62	+0.011 <i>t</i>
$\alpha$ Persei	—0.04	+0.001 <i>t</i>	$\gamma^1$ Leonis	+1.50	+0.031 <i>t</i>
$\delta$ Persei	—0.35	.000 <i>t</i>	$\rho$ Leonis	+1.07	+0.031 <i>t</i>
$\eta$ Tauri	+0.29	+0.012 <i>t</i>	$l$ Leonis	+1.34	+0.019 <i>t</i>
$\zeta$ Persei	+0.17	+0.026 <i>t</i>	$\alpha$ Ursæ Majoris	+0.19	+0.006 <i>t</i>
$\gamma^1$ Eridani	+1.44	+0.031 <i>t</i>	$\delta$ Leonis	+1.06	+0.015 <i>t</i>
$\gamma$ Tauri	+0.86	+0.028 <i>t</i>	$\delta$ Crateris	+1.57	+0.016 <i>t</i>
$\epsilon$ Tauri	+1.27	+0.022 <i>t</i>	$\tau$ Leonis	+0.58	+0.011 <i>t</i>
$\alpha$ Tauri	—0.08	—0.001 <i>t</i>	$v$ Leonis	+0.74	+0.023 <i>t</i>
$\iota$ Aurigæ	+0.73	+0.008 <i>t</i>	$\beta$ Leonis	+0.37	+0.010 <i>t</i>
11 Orionis	+0.29	+0.019 <i>t</i>	$\gamma$ Ursæ Majoris	+0.10	+0.032 <i>t</i>
$\alpha$ Aurigæ	—0.38	—0.004 <i>t</i>	$o$ Virginis	+1.35	+0.030 <i>t</i>
$\beta$ Orionis	+0.60	+0.016 <i>t</i>	$\eta$ Virginis	+0.65	+0.018 <i>t</i>
$\beta$ Tauri	+0.61	+0.020 <i>t</i>	$\beta$ Corvi	+2.32	+0.033 <i>t</i>
$\delta$ Orionis	+0.88	+0.030 <i>t</i>	12 Can. Venat.	+0.26	+0.005 <i>t</i>
$\alpha$ Leporis	+0.74	+0.026 <i>t</i>	$\theta$ Virginis	+0.83	+0.020 <i>t</i>
$\epsilon$ Orionis	+0.73	+0.014 <i>t</i>	$\alpha$ Virginis	+0.56	+0.016 <i>t</i>
$\alpha$ Columbæ	—0.76	—0.022 <i>t</i>	$\zeta$ Virginis	+0.70	+0.008 <i>t</i>
$\alpha$ Orionis	+0.79	+0.017 <i>t</i>	$\eta$ Ursæ Majoris	—0.22	—0.002 <i>t</i>
$\mu$ Geminorum	+1.35	+0.033 <i>t</i>	$\eta$ Bootis	+1.21	+0.027 <i>t</i>

# CONSTRUCTION OF THE ALMANAC.

## REDUCTIONS OF THE MEAN PLACES OF THE STARS IN THE AMERICAN EPHEMERIS, 1865-69, TO THOSE ADOPTED IN THE EPHEMERIS FOR 1870.

[*t* is reckoned from 1865.0.]

### IN DECLINATION.

	"	"		"	"
<i>α</i> Bootis	+0.09	+0.005 <i>t</i>	<i>σ</i> Sagittarii	+0.73	+0.018 <i>t</i>
<i>θ</i> Bootis	+0.85	+0.015 <i>t</i>	<i>ζ</i> Aquilæ	+0.24	+0.015 <i>t</i>
<i>α</i> <sup>2</sup> Centauri	-0.10	-0.012 <i>t</i>	<i>δ</i> Sagittarii	+3.84	+0.030 <i>t</i>
<i>ε</i> Bootis	+0.97	+0.020 <i>t</i>	<i>δ</i> Aquilæ	+0.67	-0.007 <i>t</i>
<i>α</i> <sup>2</sup> Libræ	+0.25	.000 <i>t</i>	<i>κ</i> Aquilæ	+1.61	+0.022 <i>t</i>
<i>β</i> Bootis	+1.06	+0.021 <i>t</i>	<i>γ</i> Aquilæ	+0.04	.000 <i>t</i>
<i>β</i> Libræ	+1.20	+0.006 <i>t</i>	<i>α</i> Aquilæ	+0.01	-0.003 <i>t</i>
<i>μ</i> <sup>1</sup> Bootis	+0.48	+0.009 <i>t</i>	<i>β</i> Aquilæ	+0.53	+0.014 <i>t</i>
<i>α</i> Coronæ Borealis	-0.39	-0.012 <i>t</i>	<i>τ</i> Aquilæ	+0.97	+0.009 <i>t</i>
<i>ν</i> Serpentis	+0.11	.000 <i>t</i>	<i>λ</i> Ursæ Minoris	-0.52	-0.014 <i>t</i>
<i>ε</i> Serpentis	+0.63	+0.010 <i>t</i>	<i>α</i> <sup>2</sup> Capricorni	+0.26	+0.006 <i>t</i>
<i>ε</i> Coronæ Borealis	+1.16	+0.016 <i>t</i>	<i>π</i> Capricorni	+0.53	-0.050 <i>t</i>
<i>δ</i> Scorpii	+1.60	+0.012 <i>t</i>	<i>ε</i> Delphini	+0.94	-0.023 <i>t</i>
<i>β</i> <sup>1</sup> Scorpii	+0.29	+0.001 <i>t</i>	<i>α</i> Cygni	-0.24	-0.005 <i>t</i>
<i>δ</i> Ophiuchi	+1.45	+0.002 <i>t</i>	<i>μ</i> Aquarii	+0.95	+0.020 <i>t</i>
<i>τ</i> Herculis	+0.32	-0.004 <i>t</i>	<i>ν</i> Cygni	+0.97	+0.003 <i>t</i>
<i>α</i> Scorpii	-0.21	-0.004 <i>t</i>	61 <sup>1</sup> Cygni	+0.88	+0.025 <i>t</i>
<i>η</i> Draconis	-0.70	-0.012 <i>t</i>	<i>ζ</i> Cygni	+0.77	+0.014 <i>t</i>
<i>ζ</i> Ophiuchi	+1.11	+0.017 <i>t</i>	1 Pegasi	+0.03	-0.003 <i>t</i>
<i>η</i> Herculis	+0.75	+0.006 <i>t</i>	<i>β</i> Aquarii	+1.10	+0.008 <i>t</i>
<i>κ</i> Ophiuchi	+1.25	+0.003 <i>t</i>	<i>ξ</i> Aquarii	+0.82	+0.023 <i>t</i>
<i>δ</i> Herculis	+0.70	+0.001 <i>t</i>	<i>ε</i> Pegasi	+0.70	+0.008 <i>t</i>
<i>α</i> <sup>1</sup> Herculis	+0.05	-0.002 <i>t</i>	<i>μ</i> Capricorni	+1.73	+0.011 <i>t</i>
44 Ophiuchi	+2.09	+0.035 <i>t</i>	<i>α</i> Aquarii	+0.18	-0.002 <i>t</i>
<i>β</i> Draconis	-0.06	-0.004 <i>t</i>	<i>θ</i> Aquarii	-0.43	+0.019 <i>t</i>
<i>α</i> Ophiuchi	-0.23	-0.011 <i>t</i>	<i>π</i> Aquarii	+1.04	+0.012 <i>t</i>
<i>μ</i> Herculis	+1.46	+0.017 <i>t</i>	<i>η</i> Aquarii	+0.53	+0.010 <i>t</i>
<i>γ</i> <sup>2</sup> Sagittarii	+0.92	+0.010 <i>t</i>	<i>ζ</i> Pegasi	+0.65	+0.007 <i>t</i>
<i>μ</i> <sup>1</sup> Sagittarii	+1.08	+0.013 <i>t</i>	<i>λ</i> Aquarii	+1.08	+0.023 <i>t</i>
<i>δ</i> Ursæ Minoris	+1.01	+0.024 <i>t</i>	<i>α</i> Piscis Australis	+0.66	+0.010 <i>t</i>
<i>η</i> Serpentis	+1.60	+0.010 <i>t</i>	<i>α</i> Pegasi	-0.30	-0.011 <i>t</i>
1 Aquilæ	+1.85	+0.020 <i>t</i>	<i>θ</i> Piscium	+1.86	+0.034 <i>t</i>
<i>α</i> Lyræ	-0.33	-0.002 <i>t</i>	<i>ι</i> Piscium	+0.89	+0.014 <i>t</i>
<i>β</i> Lyræ	+0.92	+0.017 <i>t</i>	<i>ω</i> Piscium	+0.94	+0.028 <i>t</i>

# TABLE I.

TABLE SHOWING THE CORRECTION REQUIRED, ON ACCOUNT OF SECOND DIFFERENCES OF THE MOON'S MOTION, IN FINDING THE GREENWICH TIME CORRESPONDING TO A CORRECTED LUNAR DISTANCE.

Approximate Interval.				Difference of the Proportional Logarithms in the Ephemeris.																											
				2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52		
h	m	h	m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	10	2	50	0	0	0	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3			
0	20	2	40	0	1	1	1	1	2	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	6	6	6	6			
0	30	2	30	0	1	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	6	7	7	7	8	8	8	9			
0	40	2	20	0	1	1	2	2	3	3	3	4	4	5	5	6	6	6	7	7	8	8	9	9	10	10	10	11			
0	50	2	10	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	12	12	13	13			
1	0	2	0	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10	10	11	12	12	13	13	14			
1	10	1	50	1	1	2	2	3	4	4	5	6	6	7	8	8	9	9	10	10	11	11	12	12	13	14	14	15			
1	20	1	40	1	1	2	3	3	4	4	5	6	6	7	8	9	9	10	10	11	12	12	13	14	14	15	16	16			
1	30	1	30	1	1	2	3	3	4	4	5	6	6	7	8	8	9	9	10	11	11	12	12	13	14	15	16	16			
				Difference of the Proportional Logarithms in the Ephemeris.																											
				54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102			
h	m	h	m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0	10	2	50	4	4	4	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6	6	6	6	7	7	7				
0	20	2	40	7	7	7	7	8	8	8	8	9	9	9	9	10	10	10	10	11	11	11	11	12	12	12	13				
0	30	2	30	9	10	10	10	11	11	12	12	12	13	13	13	14	14	14	14	15	15	16	16	16	17	17	18				
0	40	2	20	12	12	13	13	13	14	14	15	15	16	16	16	17	17	18	18	19	19	19	20	20	21	21	22				
0	50	2	10	14	14	15	15	16	16	16	17	17	18	19	19	20	20	21	21	22	22	22	23	23	24	24	25				
1	0	2	0	15	16	16	17	17	18	18	19	19	20	21	21	22	22	23	23	24	24	25	25	26	27	27	28				
1	10	1	50	16	17	17	18	18	19	19	20	21	21	22	22	23	24	24	25	25	26	27	27	28	28	29	30				
1	20	1	40	17	17	18	19	19	20	20	21	21	22	23	23	24	25	25	26	26	27	28	28	29	29	30	31				
1	30	1	30	17	18	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28	29	29	30	31	31	32				
				Difference of the Proportional Logarithms in the Ephemeris.																											
				104	106	108	110	112	114	116	118	120	122	124	126	128	130	132	134	136	138										
h	m	h	m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
0	10	2	50	7	7	7	7	7	7	8	8	8	8	8	8	8	8	9	9	9											
0	20	2	40	13	13	13	14	14	14	14	15	15	15	15	15	16	16	16	16	17											
0	30	2	30	18	18	19	19	19	20	20	20	21	21	21	22	22	22	23	23	24											
0	40	2	20	22	23	23	24	24	25	25	25	26	26	27	27	28	28	28	29	29											
0	50	2	10	26	26	27	27	28	29	29	29	30	30	31	31	32	32	33	33	34											
1	0	2	0	29	29	30	30	31	31	32	33	33	34	34	35	35	36	37	37	38											
1	10	1	50	31	31	32	32	33	34	34	35	35	36	37	37	38	38	39	40	40											
1	20	1	40	32	33	33	34	34	35	35	36	37	38	38	39	39	40	41	41	42											
1	30	1	30	32	33	34	34	35	35	36	36	37	38	39	39	40	40	41	42	42											

The Correction is to be added to the approximate Greenwich Time when the Proportional Logarithms in the Ephemeris are decreasing, and subtracted when they are increasing.



# TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.										
Sidereal.	0 <sup>h</sup> .	1 <sup>h</sup> .	2 <sup>h</sup> .	3 <sup>h</sup> .	4 <sup>h</sup> .	5 <sup>h</sup> .	6 <sup>h</sup> .	7 <sup>h</sup> .	For Seconds.	
m	m	m	m	m	m	m	m	m	s	s
0	0 0.000	0 9.830	0 19.659	0 29.489	0 39.318	0 49.146	0 58.977	1 8.807	1	0.003
1	0 0.164	0 9.993	0 19.823	0 29.653	0 39.482	0 49.312	0 59.141	1 8.971	2	.005
2	0 0.328	0 10.157	0 19.987	0 29.816	0 39.646	0 49.475	0 59.305	1 9.135	3	.008
3	0 0.491	0 10.321	0 20.151	0 29.980	0 39.810	0 49.639	0 59.469	1 9.298	4	.011
4	0 0.655	0 10.485	0 20.314	0 30.144	0 39.974	0 49.803	0 59.633	1 9.462	5	.014
5	0 0.819	0 10.649	0 20.478	0 30.308	0 40.137	0 49.967	0 59.796	1 9.626	6	.016
6	0 0.983	0 10.813	0 20.642	0 30.472	0 40.301	0 50.131	0 59.960	1 9.790	7	.019
7	0 1.147	0 10.976	0 20.806	0 30.635	0 40.465	0 50.295	1 0.124	1 9.954	8	.022
8	0 1.311	0 11.140	0 20.970	0 30.799	0 40.629	0 50.458	1 0.288	1 10.118	9	.025
9	0 1.474	0 11.304	0 21.134	0 30.963	0 40.793	0 50.622	1 0.452	1 10.281	10	.027
10	0 1.638	0 11.468	0 21.297	0 31.127	0 40.956	0 50.786	1 0.616	1 10.445	11	.030
11	0 1.802	0 11.632	0 21.461	0 31.291	0 41.120	0 50.950	1 0.779	1 10.609	12	.033
12	0 1.966	0 11.795	0 21.625	0 31.455	0 41.284	0 51.114	1 0.943	1 10.773	13	.035
13	0 2.130	0 11.959	0 21.789	0 31.618	0 41.448	0 51.278	1 1.107	1 10.937	14	.038
14	0 2.294	0 12.123	0 21.953	0 31.782	0 41.612	0 51.441	1 1.271	1 11.100	15	.041
15	0 2.457	0 12.287	0 22.117	0 31.946	0 41.776	0 51.605	1 1.435	1 11.264	16	.044
16	0 2.621	0 12.451	0 22.280	0 32.110	0 41.939	0 51.769	1 1.599	1 11.428	17	.046
17	0 2.785	0 12.615	0 22.444	0 32.274	0 42.103	0 51.933	1 1.762	1 11.592	18	.049
18	0 2.949	0 12.778	0 22.608	0 32.438	0 42.267	0 52.097	1 1.926	1 11.756	19	.052
19	0 3.113	0 12.942	0 22.772	0 32.601	0 42.431	0 52.260	1 2.090	1 11.920	20	.055
20	0 3.277	0 13.106	0 22.936	0 32.765	0 42.595	0 52.424	1 2.254	1 12.083	21	.057
21	0 3.440	0 13.270	0 23.099	0 32.929	0 42.759	0 52.588	1 2.418	1 12.247	22	.060
22	0 3.604	0 13.434	0 23.263	0 33.093	0 42.922	0 52.752	1 2.582	1 12.411	23	.063
23	0 3.768	0 13.598	0 23.427	0 33.257	0 43.086	0 52.916	1 2.745	1 12.575	24	.066
24	0 3.932	0 13.761	0 23.591	0 33.420	0 43.250	0 53.080	1 2.909	1 12.739	25	.068
25	0 4.096	0 13.925	0 23.755	0 33.584	0 43.414	0 53.243	1 3.073	1 12.903	26	.071
26	0 4.259	0 14.089	0 23.919	0 33.748	0 43.578	0 53.407	1 3.237	1 13.066	27	.074
27	0 4.423	0 14.253	0 24.082	0 33.912	0 43.742	0 53.571	1 3.401	1 13.230	28	.076
28	0 4.587	0 14.417	0 24.246	0 34.076	0 43.905	0 53.735	1 3.564	1 13.394	29	.079
29	0 4.751	0 14.581	0 24.410	0 34.240	0 44.069	0 53.899	1 3.728	1 13.558	30	.082
30	0 4.915	0 14.744	0 24.574	0 34.403	0 44.233	0 54.063	1 3.892	1 13.722	31	.085
31	0 5.079	0 14.908	0 24.738	0 34.567	0 44.397	0 54.226	1 4.056	1 13.886	32	.087
32	0 5.242	0 15.072	0 24.902	0 34.731	0 44.561	0 54.390	1 4.220	1 14.049	33	.090
33	0 5.406	0 15.236	0 25.065	0 34.895	0 44.724	0 54.554	1 4.384	1 14.213	34	.093
34	0 5.570	0 15.400	0 25.229	0 35.059	0 44.888	0 54.718	1 4.547	1 14.377	35	.096
35	0 5.734	0 15.563	0 25.393	0 35.223	0 45.052	0 54.882	1 4.711	1 14.541	36	.098
36	0 5.898	0 15.727	0 25.557	0 35.386	0 45.216	0 55.046	1 4.875	1 14.705	37	.101
37	0 6.062	0 15.891	0 25.721	0 35.550	0 45.380	0 55.209	1 5.039	1 14.868	38	.104
38	0 6.225	0 16.055	0 25.885	0 35.714	0 45.544	0 55.373	1 5.203	1 15.032	39	.106
39	0 6.389	0 16.219	0 26.048	0 35.878	0 45.707	0 55.537	1 5.367	1 15.196	40	.109
40	0 6.553	0 16.383	0 26.212	0 36.042	0 45.871	0 55.701	1 5.530	1 15.360	41	.112
41	0 6.717	0 16.546	0 26.376	0 36.206	0 46.035	0 55.865	1 5.694	1 15.524	42	.115
42	0 6.881	0 16.710	0 26.540	0 36.369	0 46.199	0 56.028	1 5.858	1 15.688	43	.117
43	0 7.045	0 16.874	0 26.704	0 36.533	0 46.363	0 56.192	1 6.022	1 15.851	44	.120
44	0 7.208	0 17.038	0 26.867	0 36.697	0 46.527	0 56.356	1 6.186	1 16.015	45	.123
45	0 7.372	0 17.202	0 27.031	0 36.861	0 46.690	0 56.520	1 6.350	1 16.179	46	.126
46	0 7.536	0 17.366	0 27.195	0 37.025	0 46.854	0 56.684	1 6.513	1 16.343	47	.128
47	0 7.700	0 17.529	0 27.359	0 37.188	0 47.018	0 56.848	1 6.677	1 16.507	48	.131
48	0 7.864	0 17.693	0 27.523	0 37.352	0 47.182	0 57.011	1 6.841	1 16.671	49	.134
49	0 8.027	0 17.857	0 27.687	0 37.516	0 47.346	0 57.175	1 7.005	1 16.834	50	.137
50	0 8.191	0 18.021	0 27.850	0 37.680	0 47.510	0 57.339	1 7.169	1 16.998	51	.139
51	0 8.355	0 18.185	0 28.014	0 37.844	0 47.673	0 57.503	1 7.332	1 17.162	52	.142
52	0 8.519	0 18.349	0 28.178	0 38.008	0 47.837	0 57.667	1 7.496	1 17.326	53	.145
53	0 8.683	0 18.512	0 28.342	0 38.171	0 48.001	0 57.831	1 7.660	1 17.490	54	.147
54	0 8.847	0 18.676	0 28.506	0 38.335	0 48.165	0 57.994	1 7.824	1 17.654	55	.150
55	0 9.010	0 18.840	0 28.670	0 38.499	0 48.329	0 58.158	1 7.988	1 17.817	56	.153
56	0 9.174	0 19.004	0 28.833	0 38.663	0 48.492	0 58.322	1 8.152	1 17.981	57	.156
57	0 9.338	0 19.168	0 28.997	0 38.827	0 48.656	0 58.486	1 8.315	1 18.145	58	.158
58	0 9.502	0 19.331	0 29.161	0 38.991	0 48.820	0 58.650	1 8.479	1 18.309	59	.161
59	0 9.666	0 19.495	0 29.325	0 39.154	0 48.984	0 58.814	1 8.643	1 18.473		

# TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.										
Sidereal.	8 <sup>h</sup> .	9 <sup>h</sup> .	10 <sup>h</sup> .	11 <sup>h</sup> .	12 <sup>h</sup> .	13 <sup>h</sup> .	14 <sup>h</sup> .	15 <sup>h</sup> .	For Seconds.	
m	m	m	m	m	m	m	m	m	s	s
0	1 18.636	1 28.466	1 38.266	1 48.125	1 57.955	2 7.784	2 17.614	2 27.443		
1	1 18.800	1 28.636	1 38.459	1 48.289	1 58.119	2 7.948	2 17.778	2 27.607	1	0.003
2	1 18.964	1 28.794	1 38.623	1 48.453	1 58.282	2 8.112	2 17.941	2 27.771	2	.005
3	1 19.128	1 28.958	1 38.787	1 48.617	1 58.446	2 8.276	2 18.105	2 27.935	3	.008
4	1 19.292	1 29.121	1 38.951	1 48.780	1 58.610	2 8.440	2 18.269	2 28.099	4	.011
5	1 19.456	1 29.285	1 39.115	1 48.944	1 58.774	2 8.603	2 18.433	2 28.263	5	.014
6	1 19.619	1 29.449	1 39.279	1 49.108	1 58.938	2 8.767	2 18.597	2 28.426	6	.016
7	1 19.783	1 29.613	1 39.442	1 49.272	1 59.101	2 8.931	2 18.761	2 28.590	7	.019
8	1 19.947	1 29.777	1 39.606	1 49.436	1 59.265	2 9.095	2 18.924	2 28.754	8	.022
9	1 20.111	1 29.940	1 39.770	1 49.600	1 59.429	2 9.259	2 19.088	2 28.918	9	.025
10	1 20.275	1 30.104	1 39.934	1 49.763	1 59.593	2 9.423	2 19.252	2 29.082	10	.027
11	1 20.439	1 30.268	1 40.098	1 49.927	1 59.757	2 9.586	2 19.416	2 29.245	11	.030
12	1 20.602	1 30.432	1 40.261	1 50.091	1 59.921	2 9.750	2 19.580	2 29.409	12	.033
13	1 20.766	1 30.596	1 40.425	1 50.255	2 0.084	2 9.914	2 19.744	2 29.573	13	.035
14	1 20.930	1 30.760	1 40.589	1 50.419	2 0.248	2 10.078	2 19.907	2 29.737	14	.038
15	1 21.094	1 30.923	1 40.753	1 50.583	2 0.412	2 10.242	2 20.071	2 29.901	15	.041
16	1 21.258	1 31.087	1 40.917	1 50.746	2 0.576	2 10.405	2 20.235	2 30.065	16	.044
17	1 21.422	1 31.251	1 41.081	1 50.910	2 0.740	2 10.569	2 20.399	2 30.228	17	.046
18	1 21.585	1 31.415	1 41.244	1 51.074	2 0.904	2 10.733	2 20.563	2 30.392	18	.049
19	1 21.749	1 31.579	1 41.408	1 51.238	2 1.067	2 10.897	2 20.727	2 30.556	19	.052
20	1 21.913	1 31.743	1 41.572	1 51.402	2 1.231	2 11.061	2 20.890	2 30.720	20	.055
21	1 22.077	1 31.906	1 41.736	1 51.565	2 1.395	2 11.225	2 21.054	2 30.884	21	.057
22	1 22.241	1 32.070	1 41.900	1 51.729	2 1.559	2 11.388	2 21.218	2 31.048	22	.060
23	1 22.404	1 32.234	1 42.064	1 51.893	2 1.723	2 11.552	2 21.382	2 31.211	23	.063
24	1 22.568	1 32.398	1 42.227	1 52.057	2 1.887	2 11.716	2 21.546	2 31.375	24	.066
25	1 22.732	1 32.562	1 42.391	1 52.221	2 2.050	2 11.880	2 21.709	2 31.539	25	.068
26	1 22.896	1 32.726	1 42.555	1 52.385	2 2.214	2 12.044	2 21.873	2 31.703	26	.071
27	1 23.060	1 32.889	1 42.719	1 52.548	2 2.378	2 12.208	2 22.037	2 31.867	27	.074
28	1 23.224	1 33.053	1 42.883	1 52.712	2 2.542	2 12.371	2 22.201	2 32.031	28	.076
29	1 23.387	1 33.217	1 43.047	1 52.876	2 2.706	2 12.535	2 22.365	2 32.194	29	.079
30	1 23.551	1 33.381	1 43.210	1 53.040	2 2.869	2 12.699	2 22.529	2 32.358	30	.082
31	1 23.715	1 33.545	1 43.374	1 53.204	2 3.033	2 12.863	2 22.692	2 32.522	31	.085
32	1 23.879	1 33.708	1 43.538	1 53.368	2 3.197	2 13.027	2 22.856	2 32.686	32	.087
33	1 24.043	1 33.872	1 43.702	1 53.531	2 3.361	2 13.191	2 23.020	2 32.850	33	.090
34	1 24.207	1 34.036	1 43.866	1 53.695	2 3.525	2 13.354	2 23.184	2 33.013	34	.093
35	1 24.370	1 34.200	1 44.029	1 53.859	2 3.689	2 13.518	2 23.348	2 33.177	35	.096
36	1 24.534	1 34.364	1 44.193	1 54.023	2 3.852	2 13.682	2 23.512	2 33.341	36	.098
37	1 24.698	1 34.528	1 44.357	1 54.187	2 4.016	2 13.846	2 23.675	2 33.505	37	.101
38	1 24.862	1 34.691	1 44.521	1 54.351	2 4.180	2 14.010	2 23.839	2 33.669	38	.104
39	1 25.026	1 34.855	1 44.685	1 54.514	2 4.344	2 14.173	2 24.003	2 33.833	39	.106
40	1 25.190	1 35.019	1 44.849	1 54.678	2 4.508	2 14.337	2 24.167	2 33.996	40	.109
41	1 25.353	1 35.183	1 45.012	1 54.842	2 4.672	2 14.501	2 24.331	2 34.160	41	.112
42	1 25.517	1 35.347	1 45.176	1 55.006	2 4.835	2 14.665	2 24.495	2 34.324	42	.115
43	1 25.681	1 35.511	1 45.340	1 55.170	2 4.999	2 14.829	2 24.658	2 34.488	43	.117
44	1 25.845	1 35.674	1 45.504	1 55.333	2 5.163	2 14.993	2 24.822	2 34.652	44	.120
45	1 26.009	1 35.838	1 45.668	1 55.497	2 5.327	2 15.156	2 24.986	2 34.816	45	.123
46	1 26.172	1 36.002	1 45.832	1 55.661	2 5.491	2 15.320	2 25.150	2 34.979	46	.126
47	1 26.336	1 36.166	1 45.995	1 55.825	2 5.655	2 15.484	2 25.314	2 35.143	47	.128
48	1 26.500	1 36.330	1 46.159	1 55.989	2 5.818	2 15.648	2 25.477	2 35.307	48	.131
49	1 26.664	1 36.493	1 46.323	1 56.153	2 5.982	2 15.812	2 25.641	2 35.471	49	.134
50	1 26.828	1 36.657	1 46.487	1 56.316	2 6.146	2 15.976	2 25.805	2 35.635	50	.137
51	1 26.992	1 36.821	1 46.651	1 56.480	2 6.310	2 16.139	2 25.969	2 35.798	51	.139
52	1 27.155	1 36.985	1 46.815	1 56.644	2 6.474	2 16.303	2 26.133	2 35.962	52	.142
53	1 27.319	1 37.149	1 46.978	1 56.808	2 6.637	2 16.467	2 26.297	2 36.126	53	.145
54	1 27.483	1 37.313	1 47.142	1 56.972	2 6.801	2 16.631	2 26.460	2 36.290	54	.147
55	1 27.647	1 37.476	1 47.306	1 57.136	2 6.965	2 16.795	2 26.624	2 36.454	55	.150
56	1 27.811	1 37.640	1 47.470	1 57.299	2 7.129	2 16.959	2 26.788	2 36.618	56	.153
57	1 27.975	1 37.804	1 47.634	1 57.463	2 7.293	2 17.122	2 26.952	2 36.781	57	.156
58	1 28.138	1 37.968	1 47.797	1 57.627	2 7.457	2 17.286	2 27.116	2 36.945	58	.158
59	1 28.302	1 38.132	1 47.961	1 57.791	2 7.620	2 17.450	2 27.280	2 37.109	59	.161

# TABLE II.—SIDEREAL INTO MEAN SOLAR TIME.

TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL.										
Sidereal.	16 <sup>h</sup> .	17 <sup>h</sup> .	18 <sup>h</sup> .	19 <sup>h</sup> .	20 <sup>h</sup> .	21 <sup>h</sup> .	22 <sup>h</sup> .	23 <sup>h</sup> .	For Seconds.	
m	m	m	m	m	m	m	m	m	s	s
0	2 37.273	2 47.102	2 56.932	3 6.762	3 16.591	3 26.421	3 36.250	3 46.080	1	0.003
1	2 37.437	2 47.266	2 57.096	3 6.925	3 16.755	3 26.585	3 36.414	3 46.244	2	.005
2	2 37.601	2 47.430	2 57.260	3 7.089	3 16.919	3 26.748	3 36.578	3 46.407	3	.008
3	2 37.764	2 47.594	2 57.424	3 7.253	3 17.083	3 26.912	3 36.742	3 46.571	4	.011
4	2 37.928	2 47.758	2 57.587	3 7.417	3 17.246	3 27.076	3 36.906	3 46.735	5	.014
5	2 38.092	2 47.922	2 57.751	3 7.581	3 17.410	3 27.240	3 37.069	3 46.899	6	.016
6	2 38.256	2 48.085	2 57.915	3 7.745	3 17.574	3 27.404	3 37.233	3 47.063	7	.019
7	2 38.420	2 48.249	2 58.079	3 7.908	3 17.738	3 27.568	3 37.397	3 47.227	8	.022
8	2 38.584	2 48.413	2 58.243	3 8.072	3 17.902	3 27.731	3 37.561	3 47.390	9	.025
9	2 38.747	2 48.577	2 58.406	3 8.236	3 18.066	3 27.895	3 37.725	3 47.554	10	.027
10	2 38.911	2 48.741	2 58.570	3 8.400	3 18.229	3 28.059	3 37.889	3 47.718	11	.030
11	2 39.075	2 48.905	2 58.734	3 8.564	3 18.393	3 28.223	3 38.052	3 47.882	12	.033
12	2 39.239	2 49.068	2 58.898	3 8.728	3 18.557	3 28.387	3 38.216	3 48.046	13	.035
13	2 39.403	2 49.232	2 59.062	3 8.891	3 18.721	3 28.550	3 38.380	3 48.210	14	.038
14	2 39.566	2 49.396	2 59.226	3 9.055	3 18.885	3 28.714	3 38.544	3 48.373	15	.041
15	2 39.730	2 49.560	2 59.389	3 9.219	3 19.049	3 28.878	3 38.708	3 48.537	16	.044
16	2 39.894	2 49.724	2 59.553	3 9.383	3 19.212	3 29.042	3 38.871	3 48.701	17	.046
17	2 40.058	2 49.888	2 59.717	3 9.547	3 19.376	3 29.206	3 39.035	3 48.865	18	.049
18	2 40.222	2 50.051	2 59.881	3 9.710	3 19.540	3 29.370	3 39.199	3 49.029	19	.052
19	2 40.386	2 50.215	3 0.045	3 9.874	3 19.704	3 29.533	3 39.363	3 49.193	20	.055
20	2 40.549	2 50.379	3 0.209	3 10.038	3 19.868	3 29.697	3 39.527	3 49.356	21	.057
21	2 40.713	2 50.543	3 0.372	3 10.202	3 20.032	3 29.861	3 39.691	3 49.520	22	.060
22	2 40.877	2 50.707	3 0.536	3 10.366	3 20.195	3 30.025	3 39.854	3 49.684	23	.063
23	2 41.041	2 50.870	3 0.700	3 10.530	3 20.359	3 30.189	3 40.018	3 49.848	24	.066
24	2 41.205	2 51.034	3 0.864	3 10.693	3 20.523	3 30.353	3 40.182	3 50.012	25	.068
25	2 41.369	2 51.198	3 1.028	3 10.857	3 20.687	3 30.516	3 40.346	3 50.175	26	.071
26	2 41.532	2 51.362	3 1.192	3 11.021	3 20.851	3 30.680	3 40.510	3 50.339	27	.074
27	2 41.696	2 51.526	3 1.355	3 11.185	3 21.014	3 30.844	3 40.674	3 50.503	28	.076
28	2 41.860	2 51.690	3 1.519	3 11.349	3 21.178	3 31.008	3 40.837	3 50.667	29	.079
29	2 42.024	2 51.853	3 1.683	3 11.513	3 21.342	3 31.172	3 41.001	3 50.831	30	.082
30	2 42.188	2 52.017	3 1.847	3 11.676	3 21.506	3 31.336	3 41.165	3 50.995	31	.085
31	2 42.352	2 52.181	3 2.011	3 11.840	3 21.670	3 31.499	3 41.329	3 51.158	32	.087
32	2 42.515	2 52.345	3 2.174	3 12.004	3 21.834	3 31.663	3 41.493	3 51.322	33	.090
33	2 42.679	2 52.509	3 2.338	3 12.168	3 21.997	3 31.827	3 41.657	3 51.486	34	.093
34	2 42.843	2 52.673	3 2.502	3 12.332	3 22.161	3 31.991	3 41.820	3 51.650	35	.096
35	2 34.007	2 52.836	2.666	3 12.496	3 22.325	3 32.155	3 41.984	3 51.814	36	.098
36	2 34.171	2 53.000	2.830	3 12.659	3 22.489	3 32.318	3 42.148	3 51.978	37	.101
37	2 43.334	2 53.164	2.994	3 12.823	3 22.653	3 32.482	3 42.312	3 52.141	38	.104
38	2 43.498	2 53.328	3.157	3 12.987	3 22.817	3 32.646	3 42.476	3 52.305	39	.106
39	2 43.662	2 53.492	3.321	3 13.151	3 22.980	3 32.810	3 42.639	3 52.469	40	.109
40	2 43.826	2 53.656	3.485	3 13.315	3 23.144	3 32.974	3 42.803	3 52.633	41	.112
41	2 43.990	2 53.819	3.649	3 13.478	3 23.308	3 33.138	3 42.967	3 52.797	42	.115
42	2 44.154	2 53.983	3.813	3 13.642	3 23.472	3 33.301	3 43.131	3 52.961	43	.117
43	2 44.317	2 54.147	3.977	3 13.806	3 23.636	3 33.465	3 43.295	3 53.124	44	.120
44	2 44.481	2 54.311	4.140	3 13.970	3 23.800	3 33.629	3 43.459	3 53.288	45	.123
45	2 44.645	2 54.475	4.304	3 14.134	3 23.963	3 33.793	3 43.622	3 53.452	46	.126
46	2 44.809	2 54.638	4.468	3 14.298	3 24.127	3 33.957	3 43.786	3 53.616	47	.128
47	2 44.973	2 54.802	4.632	3 14.461	3 24.291	3 34.121	3 43.950	3 53.780	48	.131
48	2 45.137	2 54.966	4.796	3 14.625	3 24.455	3 34.284	3 44.114	3 53.943	49	.134
49	2 45.300	2 55.130	4.960	3 14.789	3 24.619	3 34.448	3 44.278	3 54.107	50	.137
50	2 45.464	2 55.294	5.123	3 14.953	3 24.782	3 34.612	3 44.442	3 54.271	51	.139
51	2 45.628	2 55.458	5.287	3 15.117	3 24.946	3 34.776	3 44.605	3 54.435	52	.142
52	2 45.792	2 55.621	5.451	3 15.281	3 25.110	3 34.940	3 44.769	3 54.599	53	.145
53	2 45.956	2 55.785	5.615	3 15.444	3 25.274	3 35.104	3 44.933	3 54.763	54	.147
54	2 46.120	2 55.949	5.779	3 15.608	3 25.438	3 35.267	3 45.097	3 54.926	55	.150
55	2 46.283	2 56.113	5.942	3 15.772	3 25.602	3 35.431	3 45.261	3 55.090	56	.153
56	2 46.447	2 56.277	6.106	3 15.936	3 25.765	3 35.595	3 45.425	3 55.254	57	.156
57	2 46.611	2 56.441	6.270	3 16.100	3 25.929	3 35.759	3 45.589	3 55.418	58	.158
58	2 46.775	2 56.604	6.434	3 16.264	3 26.093	3 35.923	3 45.752	3 55.582	59	.161
59	2 46.939	2 56.768	6.598	3 16.427	3 26.257	3 36.086	3 45.916	3 55.746		

# TABLE III.—MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	0 <sup>h</sup> .	1 <sup>h</sup> .	2 <sup>h</sup> .	3 <sup>h</sup> .	4 <sup>h</sup> .	5 <sup>h</sup> .	6 <sup>h</sup> .	7 <sup>h</sup> .	For Seconds.
m	m	m	m	m	m	m	m	m	s
0	0 0.000	0 9.856	0 19.713	0 29.569	0 39.426	0 49.282	0 59.139	1 8.995	
1	0 0.164	0 10.021	0 19.877	0 29.734	0 39.590	0 49.447	0 59.303	1 9.160	1 0.003
2	0 0.329	0 10.185	0 20.041	0 29.898	0 39.754	0 49.611	0 59.467	1 9.324	2 .005
3	0 0.493	0 10.349	0 20.206	0 30.062	0 39.919	0 49.775	0 59.632	1 9.488	3 .008
4	0 0.657	0 10.514	0 20.370	0 30.227	0 40.083	0 49.930	0 59.796	1 9.652	4 .011
5	0 0.821	0 10.678	0 20.534	0 30.391	0 40.247	0 50.104	0 59.960	1 9.817	5 .014
6	0 0.986	0 10.842	0 20.699	0 30.555	0 40.412	0 50.268	1 0.124	1 9.981	6 .016
7	0 1.150	0 11.006	0 20.863	0 30.719	0 40.576	0 50.432	1 0.289	1 10.145	7 .019
8	0 1.314	0 11.171	0 21.027	0 30.884	0 40.740	0 50.597	1 0.453	1 10.310	8 .022
9	0 1.478	0 11.335	0 21.191	0 31.048	0 40.904	0 50.761	1 0.617	1 10.474	9 .025
10	0 1.643	0 11.499	0 21.356	0 31.212	0 41.069	0 50.925	1 0.782	1 10.638	10 .027
11	0 1.807	0 11.663	0 21.520	0 31.376	0 41.233	0 51.089	1 0.946	1 10.802	11 .030
12	0 1.971	0 11.828	0 21.684	0 31.541	0 41.397	0 51.254	1 1.110	1 10.967	12 .033
13	0 2.136	0 11.992	0 21.849	0 31.705	0 41.561	0 51.418	1 1.274	1 11.131	13 .036
14	0 2.300	0 12.156	0 22.013	0 31.869	0 41.726	0 51.582	1 1.439	1 11.295	14 .038
15	0 2.464	0 12.321	0 22.177	0 32.034	0 41.890	0 51.746	1 1.603	1 11.459	15 .041
16	0 2.628	0 12.485	0 22.341	0 32.198	0 42.054	0 51.911	1 1.767	1 11.624	16 .044
17	0 2.793	0 12.649	0 22.506	0 32.362	0 42.219	0 52.075	1 1.932	1 11.788	17 .047
18	0 2.957	0 12.813	0 22.670	0 32.526	0 42.383	0 52.239	1 2.096	1 11.952	18 .049
19	0 3.121	0 12.978	0 22.834	0 32.691	0 42.547	0 52.404	1 2.260	1 12.117	19 .052
20	0 3.285	0 13.142	0 22.998	0 32.855	0 42.711	0 52.568	1 2.424	1 12.281	20 .055
21	0 3.450	0 13.306	0 23.163	0 33.019	0 42.876	0 52.732	1 2.589	1 12.445	21 .057
22	0 3.614	0 13.471	0 23.327	0 33.183	0 43.040	0 52.896	1 2.753	1 12.609	22 .060
23	0 3.778	0 13.635	0 23.491	0 33.348	0 43.204	0 53.061	1 2.917	1 12.774	23 .063
24	0 3.943	0 13.799	0 23.656	0 33.512	0 43.368	0 53.225	1 3.081	1 12.938	24 .066
25	0 4.107	0 13.963	0 23.820	0 33.676	0 43.533	0 53.389	1 3.246	1 13.102	25 .068
26	0 4.271	0 14.128	0 23.984	0 33.841	0 43.697	0 53.554	1 3.410	1 13.266	26 .071
27	0 4.435	0 14.292	0 24.148	0 34.005	0 43.861	0 53.718	1 3.574	1 13.431	27 .074
28	0 4.600	0 14.456	0 24.313	0 34.169	0 44.026	0 53.882	1 3.739	1 13.595	28 .077
29	0 4.764	0 14.620	0 24.477	0 34.333	0 44.190	0 54.046	1 3.903	1 13.759	29 .079
30	0 4.928	0 14.785	0 24.641	0 34.498	0 44.354	0 54.211	1 4.067	1 13.924	30 .082
31	0 5.093	0 14.949	0 24.805	0 34.662	0 44.518	0 54.375	1 4.231	1 14.088	31 .085
32	0 5.257	0 15.113	0 24.970	0 34.826	0 44.683	0 54.539	1 4.396	1 14.252	32 .088
33	0 5.421	0 15.278	0 25.134	0 34.990	0 44.847	0 54.703	1 4.560	1 14.416	33 .090
34	0 5.585	0 15.442	0 25.298	0 35.155	0 45.011	0 54.868	1 4.724	1 14.581	34 .093
35	0 5.750	0 15.606	0 25.463	0 35.319	0 45.176	0 55.032	1 4.888	1 14.745	35 .096
36	0 5.914	0 15.770	0 25.627	0 35.483	0 45.340	0 55.196	1 5.053	1 14.909	36 .099
37	0 6.078	0 15.935	0 25.791	0 35.648	0 45.504	0 55.361	1 5.217	1 15.073	37 .101
38	0 6.242	0 16.099	0 25.955	0 35.812	0 45.668	0 55.525	1 5.381	1 15.238	38 .104
39	0 6.407	0 16.263	0 26.120	0 35.976	0 45.833	0 55.689	1 5.546	1 15.402	39 .107
40	0 6.571	0 16.427	0 26.284	0 36.140	0 45.997	0 55.853	1 5.710	1 15.566	40 .110
41	0 6.735	0 16.592	0 26.448	0 36.305	0 46.161	0 56.018	1 5.874	1 15.731	41 .112
42	0 6.900	0 16.756	0 26.612	0 36.469	0 46.325	0 56.182	1 6.038	1 15.895	42 .115
43	0 7.064	0 16.920	0 26.777	0 36.633	0 46.490	0 56.346	1 6.203	1 16.059	43 .118
44	0 7.228	0 17.085	0 26.941	0 36.798	0 46.654	0 56.510	1 6.367	1 16.223	44 .120
45	0 7.392	0 17.249	0 27.105	0 36.962	0 46.818	0 56.675	1 6.531	1 16.388	45 .123
46	0 7.557	0 17.413	0 27.270	0 37.126	0 46.983	0 56.839	1 6.695	1 16.552	46 .126
47	0 7.721	0 17.577	0 27.434	0 37.290	0 47.147	0 57.003	1 6.860	1 16.716	47 .129
48	0 7.885	0 17.742	0 27.598	0 37.455	0 47.311	0 57.168	1 7.024	1 16.881	48 .131
49	0 8.049	0 17.906	0 27.762	0 37.619	0 47.475	0 57.332	1 7.188	1 17.045	49 .134
50	0 8.214	0 18.070	0 27.927	0 37.783	0 47.640	0 57.496	1 7.353	1 17.209	50 .137
51	0 8.378	0 18.234	0 28.091	0 37.947	0 47.804	0 57.660	1 7.517	1 17.373	51 .140
52	0 8.542	0 18.399	0 28.255	0 38.112	0 47.968	0 57.825	1 7.681	1 17.538	52 .142
53	0 8.707	0 18.563	0 28.420	0 38.276	0 48.132	0 57.989	1 7.845	1 17.702	53 .145
54	0 8.871	0 18.727	0 28.584	0 38.440	0 48.297	0 58.153	1 8.010	1 17.866	54 .148
55	0 9.035	0 18.892	0 28.748	0 38.605	0 48.461	0 58.317	1 8.174	1 18.030	55 .151
56	0 9.199	0 19.056	0 28.912	0 38.769	0 48.625	0 58.482	1 8.338	1 18.195	56 .153
57	0 9.364	0 19.220	0 29.077	0 38.933	0 48.790	0 58.646	1 8.502	1 18.359	57 .156
58	0 9.528	0 19.384	0 29.241	0 39.097	0 48.954	0 58.810	1 8.667	1 18.523	58 .159
59	0 9.692	0 19.549	0 29.405	0 39.262	0 49.118	0 58.975	1 8.831	1 18.688	59 .162

# TABLE III.—MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.									
Mean Solar.	8 <sup>h</sup> .	9 <sup>h</sup> .	10 <sup>h</sup> .	11 <sup>h</sup> .	12 <sup>h</sup> .	13 <sup>h</sup> .	14 <sup>h</sup> .	15 <sup>h</sup> .	For Seconds.
m	m	m	m	m	m	m	m	m	s
0	1 18.852	1 28.708	1 38.565	1 48.421	1 58.278	2 8.134	2 17.991	2 27.847	1 0.003
1	1 19.016	1 28.873	1 38.729	1 48.585	1 58.442	2 8.298	2 18.155	2 28.011	2 .005
2	1 19.180	1 29.037	1 38.893	1 48.750	1 58.606	2 8.463	2 18.319	2 28.176	3 .008
3	1 19.345	1 29.201	1 39.058	1 48.914	1 58.771	2 8.627	2 18.483	2 28.340	4 .011
4	1 19.509	1 29.365	1 39.222	1 49.078	1 58.935	2 8.791	2 18.648	2 28.504	5 .014
5	1 19.673	1 29.530	1 39.386	1 49.243	1 59.099	2 8.956	2 18.812	2 28.668	6 .016
6	1 19.837	1 29.694	1 39.550	1 49.407	1 59.263	2 9.120	2 18.976	2 28.833	7 .019
7	1 20.002	1 29.858	1 39.715	1 49.571	1 59.428	2 9.284	2 19.141	2 28.997	8 .022
8	1 20.166	1 30.022	1 39.879	1 49.735	1 59.592	2 9.448	2 19.305	2 29.161	9 .025
9	1 20.330	1 30.187	1 40.043	1 49.900	1 59.756	2 9.613	2 19.469	2 29.326	10 .027
10	1 20.495	1 30.351	1 40.207	1 50.064	1 59.920	2 9.777	2 19.633	2 29.490	11 .030
11	1 20.659	1 30.515	1 40.372	1 50.228	2 0.085	2 9.941	2 19.798	2 29.654	12 .033
12	1 20.823	1 30.680	1 40.536	1 50.393	2 0.249	2 10.105	2 19.962	2 29.818	13 .036
13	1 20.987	1 30.844	1 40.700	1 50.557	2 0.413	2 10.270	2 20.126	2 29.983	14 .038
14	1 21.152	1 31.008	1 40.865	1 50.721	2 0.578	2 10.434	2 20.290	2 30.147	15 .041
15	1 21.316	1 31.172	1 41.029	1 50.885	2 0.742	2 10.598	2 20.455	2 30.311	16 .044
16	1 21.480	1 31.337	1 41.193	1 51.050	2 0.906	2 10.763	2 20.619	2 30.476	17 .047
17	1 21.644	1 31.501	1 41.357	1 51.214	2 1.070	2 10.927	2 20.783	2 30.640	18 .049
18	1 21.809	1 31.665	1 41.522	1 51.378	2 1.235	2 11.091	2 20.948	2 30.804	19 .052
19	1 21.973	1 31.829	1 41.686	1 51.542	2 1.399	2 11.255	2 21.112	2 30.968	20 .055
20	1 22.137	1 31.994	1 41.850	1 51.707	2 1.563	2 11.420	2 21.276	2 31.133	21 .057
21	1 22.302	1 32.158	1 42.015	1 51.871	2 1.727	2 11.584	2 21.440	2 31.297	22 .060
22	1 22.466	1 32.322	1 42.179	1 52.035	2 1.892	2 11.748	2 21.605	2 31.461	23 .063
23	1 22.630	1 32.487	1 42.343	1 52.200	2 2.056	2 11.912	2 21.769	2 31.625	24 .066
24	1 22.794	1 32.651	1 42.507	1 52.364	2 2.220	2 12.077	2 21.933	2 31.790	25 .068
25	1 22.959	1 32.815	1 42.672	1 52.528	2 2.385	2 12.241	2 22.098	2 31.954	26 .071
26	1 23.123	1 32.979	1 42.836	1 52.692	2 2.549	2 12.405	2 22.262	2 32.118	27 .074
27	1 23.287	1 33.144	1 43.000	1 52.857	2 2.713	2 12.570	2 22.426	2 32.283	28 .077
28	1 23.451	1 33.308	1 43.164	1 53.021	2 2.877	2 12.734	2 22.590	2 32.447	29 .079
29	1 23.616	1 33.472	1 43.329	1 53.185	2 3.042	2 12.898	2 22.755	2 32.611	30 .082
30	1 23.780	1 33.637	1 43.493	1 53.349	2 3.206	2 13.062	2 22.919	2 32.775	31 .085
31	1 23.944	1 33.801	1 43.657	1 53.514	2 3.370	2 13.227	2 23.083	2 32.940	32 .088
32	1 24.109	1 33.965	1 43.822	1 53.678	2 3.534	2 13.391	2 23.247	2 33.104	33 .090
33	1 24.273	1 34.129	1 43.986	1 53.842	2 3.699	2 13.555	2 23.412	2 33.268	34 .093
34	1 24.437	1 34.294	1 44.150	1 54.007	2 3.863	2 13.720	2 23.576	2 33.432	35 .096
35	1 24.601	1 34.458	1 44.314	1 54.171	2 4.027	2 13.884	2 23.740	2 33.597	36 .099
36	1 24.766	1 34.622	1 44.479	1 54.335	2 4.192	2 14.048	2 23.905	2 33.761	37 .101
37	1 24.930	1 34.786	1 44.643	1 54.499	2 4.356	2 14.212	2 24.069	2 33.925	38 .104
38	1 25.094	1 34.951	1 44.807	1 54.664	2 4.520	2 14.377	2 24.233	2 34.090	39 .107
39	1 25.259	1 35.115	1 44.971	1 54.828	2 4.684	2 14.541	2 24.397	2 34.254	40 .110
40	1 25.423	1 35.279	1 45.136	1 54.992	2 4.849	2 14.705	2 24.562	2 34.418	41 .112
41	1 25.587	1 35.444	1 45.300	1 55.156	2 5.013	2 14.869	2 24.726	2 34.582	42 .115
42	1 25.751	1 35.608	1 45.464	1 55.321	2 5.177	2 15.034	2 24.890	2 34.747	43 .118
43	1 25.916	1 35.772	1 45.629	1 55.485	2 5.342	2 15.198	2 25.054	2 34.911	44 .120
44	1 26.080	1 35.936	1 45.793	1 55.649	2 5.506	2 15.362	2 25.219	2 35.075	45 .123
45	1 26.244	1 36.101	1 45.957	1 55.814	2 5.670	2 15.527	2 25.383	2 35.239	46 .126
46	1 26.408	1 36.265	1 46.121	1 55.978	2 5.834	2 15.691	2 25.547	2 35.404	47 .129
47	1 26.573	1 36.429	1 46.286	1 56.142	2 5.999	2 15.855	2 25.712	2 35.568	48 .131
48	1 26.737	1 36.593	1 46.450	1 56.306	2 6.163	2 16.019	2 25.876	2 35.732	49 .134
49	1 26.901	1 36.758	1 46.614	1 56.471	2 6.327	2 16.184	2 26.040	2 35.897	50 .137
50	1 27.066	1 36.922	1 46.778	1 56.635	2 6.491	2 16.348	2 26.204	2 36.061	51 .140
51	1 27.230	1 37.086	1 46.943	1 56.799	2 6.656	2 16.512	2 26.369	2 36.225	52 .142
52	1 27.394	1 37.251	1 47.107	1 56.964	2 6.820	2 16.676	2 26.533	2 36.389	53 .145
53	1 27.558	1 37.415	1 47.271	1 57.128	2 6.984	2 16.841	2 26.697	2 36.554	54 .148
54	1 27.723	1 37.579	1 47.436	1 57.292	2 7.149	2 17.005	2 26.861	2 36.718	55 .151
55	1 27.887	1 37.743	1 47.600	1 57.456	2 7.313	2 17.169	2 27.026	2 36.882	56 .153
56	1 28.051	1 37.908	1 47.764	1 57.621	2 7.477	2 17.334	2 27.190	2 37.047	57 .156
57	1 28.215	1 38.072	1 47.928	1 57.785	2 7.641	2 17.498	2 27.354	2 37.211	58 .159
58	1 28.380	1 38.236	1 48.093	1 57.949	2 7.806	2 17.662	2 27.519	2 37.375	59 0.162
59	1 28.544	1 38.400	1 48.257	1 58.113	2 7.970	2 17.826	2 27.683	2 37.539	

# TABLE III.—MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.									
Mean Solar.	16 <sup>h</sup> .	17 <sup>h</sup> .	18 <sup>h</sup> .	19 <sup>h</sup> .	20 <sup>h</sup> .	21 <sup>h</sup> .	22 <sup>h</sup> .	23 <sup>h</sup> .	For Seconds.
m	m	m	m	m	m	m	m	m	s
0	2 37.704	2 47.560	2 57.417	3 7.273	3 17.120	3 26.986	3 36.842	3 46.699	
1	2 37.868	2 47.724	2 57.581	3 7.437	3 17.294	3 27.150	3 37.007	3 46.863	1 0.003
2	2 38.032	2 47.889	2 57.745	3 7.602	3 17.458	3 27.315	3 37.171	3 47.027	2 .005
3	2 38.196	2 48.053	2 57.909	3 7.766	3 17.622	3 27.479	3 37.335	3 47.192	3 .008
4	2 38.361	2 48.217	2 58.074	3 7.930	3 17.787	3 27.643	3 37.500	3 47.356	4 .011
5	2 38.525	2 48.381	2 58.238	3 8.094	3 17.951	3 27.807	3 37.664	3 47.520	5 .014
6	2 38.689	2 48.546	2 58.402	3 8.259	3 18.115	3 27.972	3 37.828	3 47.685	6 .016
7	2 38.854	2 48.710	2 58.566	3 8.423	3 18.279	3 28.136	3 37.992	3 47.849	7 .019
8	2 39.018	2 48.874	2 58.731	3 8.587	3 18.444	3 28.300	3 38.157	3 48.013	8 .022
9	2 39.182	2 49.039	2 58.895	3 8.751	3 18.608	3 28.464	3 38.321	3 48.177	9 .025
10	2 39.346	2 49.203	2 59.059	3 8.916	3 18.772	3 28.629	3 38.485	3 48.342	10 .027
11	2 39.511	2 49.367	2 59.224	3 9.080	3 18.937	3 28.793	3 38.649	3 48.506	11 .030
12	2 39.675	2 49.531	2 59.388	3 9.244	3 19.101	3 28.957	3 38.814	3 48.670	12 .033
13	2 39.839	2 49.696	2 59.552	3 9.409	3 19.265	3 29.122	3 38.978	3 48.834	13 .036
14	2 40.003	2 49.860	2 59.716	3 9.573	3 19.429	3 29.286	3 39.142	3 48.999	14 .038
15	2 40.168	2 50.024	2 59.881	3 9.737	3 19.594	3 29.450	3 39.307	3 49.163	15 .041
16	2 40.332	2 50.188	3 0.045	3 9.901	3 19.758	3 29.614	3 39.471	3 49.327	16 .044
17	2 40.496	2 50.353	3 0.209	3 10.066	3 19.922	3 29.779	3 39.635	3 49.492	17 .047
18	2 40.661	2 50.517	3 0.373	3 10.230	3 20.086	3 29.943	3 39.799	3 49.656	18 .049
19	2 40.825	2 50.681	3 0.538	3 10.394	3 20.251	3 30.107	3 39.964	3 49.820	19 .052
20	2 40.989	2 50.846	3 0.702	3 10.559	3 20.415	3 30.271	3 40.128	3 49.984	20 .055
21	2 41.153	2 51.010	3 0.866	3 10.723	3 20.579	3 30.436	3 40.292	3 50.149	21 .057
22	2 41.318	2 51.174	3 1.031	3 10.887	3 20.744	3 30.600	3 40.456	3 50.313	22 .060
23	2 41.482	2 51.338	3 1.195	3 11.051	3 20.908	3 30.764	3 40.621	3 50.477	23 .063
24	2 41.646	2 51.503	3 1.359	3 11.216	3 21.072	3 30.929	3 40.785	3 50.642	24 .066
25	2 41.810	2 51.667	3 1.523	3 11.380	3 21.236	3 31.093	3 40.949	3 50.806	25 .068
26	2 41.975	2 51.831	3 1.688	3 11.544	3 21.401	3 31.257	3 41.114	3 50.970	26 .071
27	2 42.139	2 51.995	3 1.852	3 11.708	3 21.565	3 31.421	3 41.278	3 51.134	27 .074
28	2 42.303	2 52.160	3 2.016	3 11.873	3 21.729	3 31.586	3 41.442	3 51.299	28 .077
29	2 42.468	2 52.324	3 2.181	3 12.037	3 21.893	3 31.750	3 41.606	3 51.463	29 .079
30	2 42.632	2 52.488	3 2.345	3 12.201	3 22.058	3 31.914	3 41.771	3 51.627	30 .082
31	2 42.796	2 52.653	3 2.509	3 12.366	3 22.222	3 32.078	3 41.935	3 51.791	31 .085
32	2 42.960	2 52.817	3 2.673	3 12.530	3 22.386	3 32.243	3 42.099	3 51.956	32 .088
33	2 43.125	2 52.981	3 2.838	3 12.694	3 22.551	3 32.407	3 42.264	3 52.120	33 .090
34	2 43.289	2 53.145	3 3.002	3 12.858	3 22.715	3 32.571	3 42.428	3 52.284	34 .093
35	2 43.453	2 53.310	3 3.166	3 13.023	3 22.879	3 32.736	3 42.592	3 52.449	35 .096
36	2 43.617	2 53.474	3 3.330	3 13.187	3 23.043	3 32.900	3 42.756	3 52.613	36 .099
37	2 43.782	2 53.638	3 3.495	3 13.351	3 23.208	3 33.064	3 42.921	3 52.777	37 .101
38	2 43.946	2 53.803	3 3.659	3 13.515	3 23.372	3 33.228	3 43.085	3 52.941	38 .104
39	2 44.110	2 53.967	3 3.823	3 13.680	3 23.536	3 33.393	3 43.249	3 53.106	39 .107
40	2 44.275	2 54.131	3 3.988	3 13.844	3 23.700	3 33.557	3 43.413	3 53.270	40 .110
41	2 44.439	2 54.295	3 4.152	3 14.008	3 23.865	3 33.721	3 43.578	3 53.434	41 .112
42	2 44.603	2 54.460	3 4.316	3 14.173	3 24.029	3 33.886	3 43.742	3 53.598	42 .115
43	2 44.767	2 54.624	3 4.480	3 14.337	3 24.193	3 34.050	3 43.906	3 53.763	43 .118
44	2 44.932	2 54.788	3 4.645	3 14.501	3 24.358	3 34.214	3 44.071	3 53.927	44 .120
45	2 45.096	2 54.952	3 4.809	3 14.665	3 24.522	3 34.378	3 44.235	3 54.091	45 .123
46	2 45.260	2 55.117	3 4.973	3 14.830	3 24.686	3 34.543	3 44.399	3 54.256	46 .126
47	2 45.425	2 55.281	3 5.137	3 14.994	3 24.850	3 34.707	3 44.563	3 54.420	47 .129
48	2 45.589	2 55.445	3 5.302	3 15.158	3 25.015	3 34.871	3 44.728	3 54.584	48 .131
49	2 45.753	2 55.610	3 5.466	3 15.322	3 25.179	3 35.035	3 44.892	3 54.748	49 .134
50	2 45.917	2 55.774	3 5.630	3 15.487	3 25.343	3 35.200	3 45.056	3 54.913	50 .137
51	2 46.082	2 55.938	3 5.795	3 15.651	3 25.508	3 35.364	3 45.220	3 55.077	51 .140
52	2 46.246	2 56.102	3 5.959	3 15.815	3 25.672	3 35.528	3 45.385	3 55.241	52 .142
53	2 46.410	2 56.267	3 6.123	3 15.980	3 25.836	3 35.693	3 45.549	3 55.405	53 .145
54	2 46.574	2 56.431	3 6.287	3 16.144	3 26.000	3 35.857	3 45.713	3 55.570	54 .148
55	2 46.739	2 56.595	3 6.452	3 16.308	3 26.165	3 36.021	3 45.878	3 55.734	55 .151
56	2 46.903	2 56.759	3 6.616	3 16.472	3 26.329	3 36.185	3 46.042	3 55.898	56 .153
57	2 47.067	2 56.924	3 6.780	3 16.637	3 26.493	3 36.350	3 46.206	3 56.063	57 .156
58	2 47.232	2 57.088	3 6.944	3 16.801	3 26.657	3 36.514	3 46.370	3 56.227	58 .159
59	2 47.396	2 57.252	3 7.109	3 16.965	3 26.822	3 36.678	3 46.535	3 56.391	59 0.162

# TABLE IV.

TABLE GIVING, FOR SEVEN POLAR STARS, THE CORRECTIONS  
OF THE APPARENT PLACE WHICH DEPEND ON THE  
ARGUMENT  $2\zeta$  IN NUTATION.—1870.0.

$\zeta$ or $\zeta - 180^\circ$ .	$\alpha$ Urs. Min.		51 Cephei.		32 Camelop.		$\epsilon$ Urs. Min.		$\delta$ Urs. Min.		$\lambda$ Urs. Min.		$\sigma$ Octantis.		$\zeta$ or $\zeta - 180^\circ$ .
	R. A.	Dec.	R. A.	Dec.	R. A.	Dec.	R. A.	Dec.	R. A.	Dec.	R. A.	Dec.	R. A.	Dec.	
0	-233	+03	+221	+09	+056	-02	+011	-09	-006	-09	-153	-08	+013	-09	90
2	238	.02	.012	.09	.056	.01	.013	.08	-001	.09	.133	.08	-018	.09	92
4	242	.02	+003	.09	.055	-01	.015	.08	+005	.09	.115	.08	.049	.09	94
6	245	+01	-005	.09	.055	.00	.016	.08	.010	.09	.097	.08	.080	.09	96
8	246	.00	.014	.09	.054	.00	.018	.08	.016	.09	.078	.09	.110	.09	98
10	-246	.00	-023	+09	+052	+01	+019	-07	+021	-08	-059	-09	-139	.08	100
12	246	-01	.031	.09	.051	.01	.021	.07	.026	.08	.040	.09	.168	.08	102
14	244	.01	.039	.08	.049	.02	.022	.07	.031	.08	-020	.09	.196	.08	104
16	241	.02	.048	.08	.047	.03	.023	.06	.036	.08	.003	.09	.224	.08	106
18	237	.02	.056	.08	.045	.03	.024	.06	.041	.07	+019	.09	.250	.07	108
20	-230	-03	-063	+08	+042	+04	+025	-05	+046	-07	+039	-08	-275	.07	110
22	224	.03	.071	.07	.039	.04	.026	.05	.050	.07	.058	.08	.298	.07	112
24	216	.04	.078	.07	.036	.05	.027	.04	.054	.06	.078	.08	.320	.06	114
26	207	.04	.084	.07	.033	.05	.027	.04	.058	.06	.097	.08	.341	.06	116
28	197	.05	.091	.06	.030	.06	.028	.03	.062	.05	.115	.08	.360	.05	118
30	-187	-05	-096	+06	+027	+06	+028	-02	+065	-05	+133	-07	-377	-05	120
32	175	.06	.102	.05	.023	.06	.028	.02	.063	.04	.150	.07	.392	.04	122
34	162	.06	.107	.05	.020	.07	.028	.01	.071	.04	.166	.07	.406	.03	124
36	149	.07	.111	.04	.016	.07	.028	-01	.073	.03	.182	.06	.417	.03	126
38	135	.07	.115	.03	.012	.07	.028	.00	.075	.03	.196	.06	.426	.02	128
40	-120	-07	-118	+03	+008	+07	+028	+01	+077	-02	+210	-05	-434	-02	130
42	105	.07	.120	.02	+004	.08	.027	.01	.078	.01	.223	.05	.439	.01	132
44	.089	.08	.122	.02	.000	.08	.026	.02	.079	-01	.235	.04	.442	-01	134
46	.073	.08	.124	+01	-004	.08	.026	.02	.079	.00	.245	.04	.443	.00	136
48	.056	.08	.125	.00	.007	.08	.025	.03	.079	.00	.254	.03	.442	+01	138
50	-039	-08	-125	.00	-011	+08	+024	+04	+079	+01	+262	-02	-438	+01	140
52	.022	.08	.125	-01	.015	.08	.023	.04	.078	.02	.269	.02	.433	.02	142
54	-005	.08	.124	.01	.019	.08	.021	.05	.077	.02	.275	.01	.425	.02	144
56	+012	.08	.122	.02	.022	.08	.020	.05	.075	.03	.279	-01	.415	.03	146
58	.029	.08	.120	.03	.026	.08	.018	.06	.073	.03	.282	.00	.404	.04	148
60	+046	-08	-117	-03	-029	+08	+017	+06	+071	+04	+283	+01	-390	+04	150
62	.063	.08	.114	.04	.033	.08	.015	.07	.069	.04	.283	.01	.374	.05	152
64	.079	.08	.110	.04	.036	.07	.014	.07	.066	.05	.281	.02	.357	.05	154
66	.095	.08	.106	.05	.039	.07	.012	.07	.063	.05	.279	.02	.338	.06	156
68	.111	.07	.101	.05	.041	.07	.010	.08	.059	.06	.275	.03	.317	.06	158
70	+126	-07	.095	-06	-044	+06	+008	+08	+055	+06	+269	+03	-294	+07	160
72	141	.07	.089	.06	.046	.06	.006	.08	.051	.07	.263	.04	.271	.07	162
74	154	.06	.083	.07	.048	.06	.004	.08	.047	.07	.255	.04	.245	.07	164
76	167	.06	.076	.07	.050	.05	+002	.08	.043	.08	.245	.05	.219	.08	166
78	180	.06	.069	.07	.052	.05	.000	.09	.038	.08	.235	.05	.192	.08	168
80	+191	-05	-062	-08	-053	+04	-002	+09	+033	+08	+223	+06	-163	+08	170
82	201	.05	.054	.08	.054	.04	.004	.09	.028	.08	.210	.06	.134	.08	172
84	211	.04	.046	.08	.055	.03	.006	.09	.023	.09	.197	.07	.105	.09	174
86	219	.04	.038	.08	.056	.03	.008	.09	.017	.09	.182	.07	.074	.09	176
88	226	.03	.029	.09	.056	.02	.010	.09	.012	.09	.166	.08	.044	.09	178
90	+233	-03	-021	-09	-056	+02	-011	+09	+006	+09	+150	+08	-013	+09	180

NOTE.—When the Argument is on the right-hand side of the Table, the sign of the correction is to be reversed.  
The Moon's Mean Longitude,  $\zeta$ , may be found on page 344.

# TABLE V.

TABLE GIVING THE CORRECTIONS OF THE CONSTANTS  $A$  AND  $B$  WHICH  
DEPEND ON THE ARGUMENT  $2\epsilon$ , IN UNITS OF THE FIFTH  
DECIMAL FOR  $A$ , AND OF THE FOURTH FOR  $B$ .

$\epsilon$ or $\epsilon - 180^\circ$	$A$	$B$	$\epsilon$ or $\epsilon - 180^\circ$	$A$	$B$	$\epsilon$ or $\epsilon - 180^\circ$	$A$	$B$	$\epsilon$ or $\epsilon - 180^\circ$	$A$	$B$
0°	- 0	-886	45°	-405	+ 0	90°	+ 0	+886	135°	+405	- 0
1	14	885	46	405	31	91	14	885	136	405	31
2	29	883	47	404	61	92	29	883	137	404	61
3	42	881	48	403	93	93	42	881	138	403	93
4	56	877	49	401	124	94	56	877	139	401	124
5	- 70	-872	50	-399	+153	95	+ 70	+872	140	+399	-153
6	84	866	51	396	184	96	84	866	141	396	184
7	98	859	52	393	215	97	98	859	142	393	215
8	112	851	53	389	244	98	112	851	143	389	244
9	125	843	54	385	274	99	125	843	144	385	274
10	-138	-833	55	-380	+303	100	+138	+833	145	+380	-333
11	152	821	56	375	331	101	152	821	146	375	331
12	165	809	57	370	360	102	165	809	147	370	360
13	178	796	58	364	388	103	178	796	148	364	388
14	190	782	59	358	415	104	190	782	149	358	415
15	-202	-767	60	-351	+443	105	+202	+767	150	+351	-443
16	214	751	61	344	470	106	214	751	151	344	470
17	226	734	62	336	495	107	226	734	152	336	495
18	238	716	63	328	520	108	238	716	153	328	520
19	249	698	64	319	545	109	249	698	154	319	545
20	-261	-678	65	-310	+570	110	+261	+678	155	+310	-570
21	271	659	66	301	592	111	271	659	156	301	592
22	282	637	67	291	615	112	282	637	157	291	615
23	291	615	68	282	637	113	291	615	158	282	637
24	301	592	69	271	659	114	301	592	159	271	659
25	-310	-570	70	-261	+678	115	+310	+570	160	+261	-678
26	319	545	71	249	698	116	319	545	161	249	698
27	328	520	72	238	716	117	328	520	162	238	716
28	336	495	73	226	734	118	336	495	163	226	734
29	344	470	74	214	751	119	344	470	164	214	751
30	-351	-443	75	-202	-767	120	+351	+443	165	+202	-767
31	358	415	76	190	782	121	358	415	166	190	782
32	364	388	77	178	796	122	364	388	167	178	796
33	370	360	78	165	809	123	370	360	168	165	809
34	375	331	79	152	821	124	375	331	169	152	821
35	-380	-303	80	-138	+833	125	+380	+303	170	+138	-833
36	385	274	81	125	843	126	385	274	171	125	843
37	389	244	82	112	851	127	389	244	172	112	851
38	393	215	83	98	859	128	393	215	173	98	859
39	396	184	84	84	866	129	396	184	174	84	866
40	-399	-153	85	- 70	+872	130	+399	+153	175	+ 70	-872
41	401	124	86	56	877	131	401	124	176	56	877
42	403	93	87	42	881	132	403	93	177	42	881
43	404	61	88	29	883	133	404	61	178	29	883
44	405	31	89	14	885	134	405	31	179	14	885
45	-405	- 0	90	- 0	+886	135	+405	+ 0	180	+ 0	-886

NOTE.—The Moon's Mean Longitude  $\epsilon$ , may be found on page 344.



# TABLE VI.

TABLE GIVING THE CORRECTIONS OF THE CONSTANTS  $A$  AND  $B$  DEPEND-  
ING ON THE SMALL TERMS OF THE NUTATION, IN UNITS OF THE  
FIFTH DECIMAL FOR  $A$ , AND OF THE FOURTH FOR  $B$ .

Arg.	$\zeta - \Gamma'$	$2\odot - 2\Gamma'$	$2\odot - 2\Omega$	$2\odot - \Omega$		$2\Gamma' - \Omega$		$\Gamma'$		$\odot$	
	$A$	$A$	$A$	$A$	$B$	$A$	$B$	$A$	$B$	$A$	$B$
0	+ 0	+ 0	- 0	+ 0	+67	+0	+24	+5	+ 8	-11	- 5
10	23	2	1	4	66	2	24	6	+ 4	10	+ 9
20	46	3	2	9	63	3	23	7	- 2	7	21
30	68	5	2	12	58	4	21	8	8	- 2	27
40	87	6	3	16	51	6	18	8	13	+ 4	25
50	+103	+ 8	- 4	+19	+43	+7	+15	+7	-19	+ 8	+17
60	117	9	4	22	34	8	12	6	24	11	+ 5
70	127	9	4	24	23	8	8	4	23	10	- 9
80	133	10	5	25	+12	9	+ 4	+2	30	7	21
90	135	10	5	25	0	9	0	0	31	+ 2	27
100	+133	+10	- 5	+25	-12	+9	- 4	-2	-30	- 4	-25
110	127	9	5	24	23	8	8	4	28	8	17
120	117	9	4	22	34	8	12	6	24	11	- 5
130	103	8	4	19	43	7	15	7	19	10	+ 9
140	87	6	3	16	51	6	18	8	13	7	21
150	+ 68	+ 5	- 2	+12	-58	+4	-21	-8	- 8	- 2	+27
160	46	3	2	9	63	3	23	7	- 2	+ 4	25
170	+ 23	+ 2	- 1	+ 4	66	+2	24	6	+ 4	8	17
180	0	0	0	0	67	0	24	5	8	11	+ 5
190	- 23	- 2	+ 1	- 4	66	-2	24	4	12	10	- 9
200	- 46	- 3	+ 2	- 9	-63	-3	-23	-2	+14	+ 7	-21
210	68	5	2	12	58	4	21	-1	16	+ 2	27
220	87	6	3	16	51	6	18	0	16	- 4	25
230	103	8	4	19	43	7	15	+1	16	8	17
240	117	9	4	22	34	8	12	1	16	11	- 5
250	-127	- 9	+ 5	-24	-23	-8	- 8	+1	+16	-10	+ 9
260	133	10	5	25	-12	9	- 4	0	15	7	21
270	135	10	5	25	0	9	0	0	15	- 2	27
280	133	10	5	25	+12	9	+ 4	0	15	+ 4	25
290	127	9	5	24	23	8	8	-1	16	8	17
300	-117	- 9	+ 4	-22	+34	-8	+12	-1	+16	+11	+ 5
310	103	8	4	19	43	7	15	-1	16	10	- 9
320	87	6	3	16	51	6	18	0	16	7	21
330	68	5	2	12	58	4	21	+1	16	+ 2	27
340	46	3	2	9	63	3	23	2	14	- 4	25
350	- 23	- 2	+ 1	- 4	+66	-2	+24	+4	+12	- 8	-17
360	- 0	- 0	+ 0	- 0	+67	-0	+24	+5	+ 8	-11	- 5

Year.	$\zeta - \Gamma'$	$2\odot - 2\Gamma'$	$2\odot - 2\Omega$	$2\odot - \Omega$	$2\Gamma' - \Omega$	$\Gamma'$	$3\odot - \Gamma$
1865	335.6	221.2	129.7	345.6	124.5	353.3	232.0
1866	64.4	139.3	167.8	4.5	225.2	31.0	231.3
1867	153.1	57.5	266.0	23.4	325.9	71.7	200.6
1868	254.9	337.4	246.3	44.3	66.8	112.4	202.9
1869	343.6	255.6	234.5	62.2	167.5	153.1	202.2
1870	72.3	173.8	322.7	81.1	268.2	193.7	231.5
1871	161.0	91.9	0.9	100.0	8.9	234.4	230.9
1872	262.8	11.8	41.2	121.0	109.8	275.2	233.1
1873	351.5	200.0	79.4	139.9	210.5	315.8	232.5
1874	80.3	208.2	117.7	153.8	311.2	356.5	231.8
Daily Motion.	13.065	1.749	2.007	2.024	0.276	0.111	2.957

NOTE.—The arguments given above are for Jan. 0.5 in common years, but for Jan. 1.5 in leap years.

# TABLE VII.

## TABLE FOR THE LIBRATION OF THE MOON.

$\Omega - \lambda$	$\Delta \lambda$	$a^{-1}$	$B$	$\Omega - \lambda$	$\Omega - \lambda$	$\Delta \lambda$	$a^{-1}$	$B$	$\Omega - \lambda$
0°	0.0	39	0 0.0	180°	46°	0.6	56	1 3.9	134°
1	0.0	39	0 1.6	179	47	0.6	57	1 4.9	133
2	0.0	39	0 3.1	178	48	0.6	58	1 6.0	132
3	0.1	39	0 4.7	177	49	0.6	59	1 7.0	131
4	0.1	39	0 6.2	176	50	0.6	60	1 8.0	130
5	0.1	39	0 7.7	175	51	0.6	62	1 9.0	129
6	0.2	39	0 9.3	174	52	0.6	63	1 10.0	128
7	0.2	39	0 10.8	173	53	0.5	64	1 10.9	127
8	0.2	39	0 12.4	172	54	0.5	66	1 11.8	126
9	0.2	39	0 13.9	171	55	0.5	67	1 12.7	125
10	0.2	39	0 15.4	170	56	0.5	69	1 13.6	124
11	0.3	39	0 16.9	169	57	0.5	71	1 14.5	123
12	0.3	40	0 18.5	168	58	0.5	73	1 15.3	122
13	0.3	40	0 20.0	167	59	0.5	75	1 16.1	121
14	0.3	40	0 21.5	166	60	0.5	77	1 16.9	120
15	0.3	40	0 23.0	165	61	0.5	80	1 17.6	119
16	0.3	40	0 24.5	164	62	0.5	83	1 18.4	118
17	0.3	40	0 26.0	163	63	0.5	86	1 19.1	117
18	0.3	41	0 27.4	162	64	0.5	89	1 19.8	116
19	0.4	41	0 28.9	161	65	0.4	92	1 20.4	115
20	0.4	41	0 30.4	160	66	0.4	95	1 21.1	114
21	0.4	41	0 31.8	159	67	0.4	99	1 21.7	113
22	0.4	42	0 33.2	158	68	0.4	103	1 22.3	112
23	0.4	42	0 34.7	157	69	0.4	108	1 22.9	111
24	0.4	42	0 36.1	156	70	0.4	113	1 23.4	110
25	0.4	43	0 37.5	155	71	0.4	119	1 23.9	109
26	0.5	43	0 38.9	154	72	0.4	125	1 24.4	108
27	0.5	43	0 40.3	153	73	0.4	132	1 24.9	107
28	0.5	44	0 41.7	152	74	0.3	141	1 25.3	106
29	0.5	44	0 43.1	151	75	0.3	150	1 25.7	105
30	0.5	45	0 44.4	150	76	0.3	160	1 26.1	104
31	0.5	45	0 45.7	149	77	0.3	172	1 26.5	103
32	0.5	46	0 47.0	148	78	0.2	186	1 26.8	102
33	0.5	46	0 48.4	147	79	0.2	202	1 27.1	101
34	0.5	47	0 49.7	146	80	0.2	222	1 27.4	100
35	0.5	47	0 51.0	145	81	0.2	247	1 27.7	99
36	0.5	48	0 52.2	144	82	0.2	278	1 27.9	98
37	0.5	48	0 53.4	143	83	0.1	318	1 28.1	97
38	0.6	49	0 54.7	142	84	0.1	370	1 28.3	96
39	0.6	50	0 55.9	141	85	0.1	440	1 28.5	95
40	0.6	50	0 57.1	140	86	0.1	555	1 28.6	94
41	0.6	51	0 58.3	139	87	0.1	740	1 28.7	93
42	0.6	52	0 59.4	138	88	0.0	1110	1 28.7	92
43	0.6	53	1 0.6	137	89	0.0	2220	1 28.8	91
44	0.6	54	1 1.7	136	90	0.0	$\infty$	1 28.8	90
45	0.6	55	1 2.8	135					

$\Delta \lambda$  has the sign of  $\tan. (\lambda - \Omega)$

$a$  has the sign of  $\cos. (\Omega - \lambda)$

$B$  has the sign of  $\sin. (\Omega - \lambda)$

When  $\Omega - \lambda$  exceeds  $180^\circ$  the table is to be entered with  $(\Omega - \lambda) - 180^\circ$  as the argument in the column  $\Omega - \lambda$ .

# NEPTUNE, 1866.

## WASHINGTON MEAN TIME.

Date.	Apparent Right Ascension.	Var. for 1 day.	Apparent Declina- tion.	Var. for 1 day.	Meridian Passage.	Date.	Apparent Right Ascension.	Var. for 1 day.	Apparent Declina- tion.	Var. for 1 day.	Meridian Passage.
1866.	Noon.	Noon.	Noon.	Noon.		1866.	Noon.	Noon.	Noon.	Noon.	
Jan. 1	<sup>h</sup> 0 <sup>m</sup> 31 <sup>s</sup> 12.23	+1.67	<sup>°</sup> 42 <sup>'</sup> 8.0	+13.9	<sup>h</sup> 5 <sup>m</sup> 45.8	July 5	<sup>h</sup> 0 <sup>m</sup> 49 <sup>s</sup> 31.69	+1.39	<sup>°</sup> 37 <sup>'</sup> 44.2	+ 5.0	<sup>h</sup> 17 <sup>m</sup> 52.7
6	0 31 22.18	2.30	1 43 27.5	17.9	5 26.3	10	0 49 37.13	0.78	3 37 59.7	+ 1.2	17 33.1
11	0 31 35.25	2.92	1 45 6.8	21.8	5 6.8	15	0 49 39.54	+0.18	3 37 56.0	- 2.6	17 13.6
16	0 31 51.38	3.53	1 47 5.4	25.6	4 47.4	20	0 49 38.92	-0.42	3 37 33.3	6.4	16 54.0
21	0 32 10.49	4.11	1 40 22.5	20.2	4 28.1	25	0 49 35.31	1.02	3 36 52.0	10.1	16 34.2
26	0 32 32.43	4.66	1 51 57.1	32.6	4 8.7	30	0 49 28.76	1.60	3 35 52.5	13.7	16 14.4
31	0 32 57.05	5.18	1 54 48.2	35.8	3 49.5	Aug. 4	0 49 19.34	2.17	3 34 35.4	17.2	15 54.5
Feb. 5	0 33 24.22	5.68	1 57 54.7	38.8	3 30.2	9	0 49 7.12	2.72	3 33 1.2	20.5	15 34.7
10	0 33 53.77	6.14	2 1 15.5	41.5	3 11.1	14	0 48 52.22	3.24	3 31 10.9	23.6	15 14.8
15	0 34 25.52	6.56	2 4 49.4	44.0	2 52.0	19	0 48 34.78	3.73	3 29 5.4	26.5	14 54.7
20	0 34 59.28	6.94	2 8 35.0	46.2	2 33.0	24	0 48 14.96	4.19	3 26 45.8	29.2	14 34.7
25	0 35 34.82	7.27	2 12 30.8	48.1	2 13.8	29	0 47 52.97	4.60	3 24 13.5	31.6	14 14.7
Mar. 2	0 36 11.92	7.56	2 16 35.3	49.7	1 54.8	Sept. 3	0 47 28.99	4.98	3 21 29.8	33.8	13 54.7
7	0 36 50.39	7.82	2 20 47.2	51.0	1 35.8	8	0 47 3.22	5.31	3 18 36.0	35.6	13 34.6
12	0 37 30.00	8.02	2 25 5.0	52.0	1 16.8	13	0 46 35.93	5.59	3 15 33.9	37.1	13 14.4
17	0 38 10.53	8.18	2 29 27.1	52.7	0 57.8	18	0 46 7.38	5.82	3 12 25.1	38.3	12 54.3
22	0 38 51.73	8.29	2 33 52.0	53.2	0 38.9	23	0 45 37.84	6.99	3 9 11.7	39.1	12 34.2
27	0 39 33.36	8.35	2 38 18.2	53.3	0 19.8	28	0 45 7.59	6.10	3 5 55.2	39.5	12 14.0
Apr. 1	0 40 15.18	8.37	2 42 44.1	53.1	<sup>h</sup> 0 <sup>m</sup> 0.9	Oct. 3	0 44 36.94	6.15	3 2 37.5	39.5	11 53.9
6	0 40 56.98	8.34	2 47 8.4	52.6	<sup>h</sup> 23 <sup>m</sup> 57.1	8	0 44 6.15	6.15	2 59 20.6	39.2	11 33.7
11	0 41 38.54	8.27	2 51 29.6	51.8	23 19.2	13	0 43 35.56	6.08	2 56 6.5	38.4	11 13.5
16	0 42 19.63	8.15	2 55 46.3	50.8	23 0.2	18	0 43 5.48	5.95	2 52 57.2	37.3	10 53.4
21	0 43 0.00	7.99	2 59 56.9	49.4	22 41.2	23	0 42 36.20	5.76	2 49 54.4	35.8	10 33.2
26	0 43 39.44	7.78	3 4 0.2	47.8	22 22.2	28	0 42 8.01	5.51	2 47 0.1	33.9	10 13.1
May 1	0 44 17.74	7.53	3 7 54.8	46.0	22 3.1	Nov. 2	0 41 41.20	5.21	2 44 15.9	31.7	9 53.0
6	0 44 54.70	7.25	3 11 39.5	43.9	21 44.1	7	0 41 16.03	4.85	2 41 43.7	29.1	9 32.9
11	0 45 30.14	6.92	3 15 13.3	41.6	21 25.0	12	0 40 52.77	4.44	2 39 24.9	26.3	9 12.9
16	0 46 3.85	6.55	3 18 34.9	39.0	21 6.1	17	0 40 31.68	3.99	2 37 21.1	23.2	8 52.9
21	0 46 35.63	6.15	3 21 43.1	36.2	20 46.9	22	0 40 12.97	3.49	2 35 33.6	19.8	8 32.9
26	0 47 5.32	5.72	3 24 37.0	33.3	20 27.7	27	0 39 56.82	2.96	2 34 3.4	16.2	8 13.0
31	0 47 32.78	5.26	3 27 15.7	30.2	20 8.4	Dec. 2	0 39 43.40	2.40	2 32 51.5	12.5	7 53.1
June 5	0 47 57.87	4.77	3 29 38.5	26.9	19 49.2	7	0 39 32.87	1.81	2 31 58.8	8.6	7 33.3
10	0 48 20.44	4.25	3 31 44.6	23.5	19 30.0	12	0 39 25.35	1.20	2 31 26.0	4.5	7 13.6
15	0 48 40.36	3.71	3 33 33.3	20.0	19 10.6	17	0 39 20.95	-0.57	2 31 13.5	- 0.4	6 53.8
20	0 48 57.51	3.15	3 35 3.9	16.3	18 51.2	22	0 39 19.72	+0.07	2 31 21.6	+ 3.7	6 34.1
25	0 49 11.82	2.57	3 36 16.1	12.6	18 31.8	27	0 39 21.68	0.71	2 31 50.3	7.8	6 14.5
30	0 49 23.24	+1.99	+3 37 9.6	+ 8.8	18 12.2	32	0 39 26.85	+1.36	+2 32 39.5	+11.9	5 55.0

(From Professor Newcomb's Tables.)

# NEPTUNE, 1867.

## WASHINGTON MEAN TIME.

Date.	Apparent Right Ascension.	Var. for 1 day.	Apparent Declina- tion.	Var. for 1 day.	Meridian Passage.	Date.	Apparent Right Ascension.	Var. for 1 day.	Apparent Declina- tion.	Var. for 1 day.	Meridian Passage.
1867.	Noon.	Noon.	Noon.	Noon.		1867.	Noon.	Noon.	Noon.	Noon.	
Jan. 1	h m s	+	° ' "	+	h m s	July 5	h m s	+	° ' "	+	h m s
6	0 39 26.85	+1.36	+2 32 39.5	+11.9	5 54.9	10	0 57 48.83	+1.70	+4 27 50.0	+ 6.8	18 2.0
11	0 39 35.24	2.00	2 33 49.2	16.0	5 35.4	15	0 57 55.82	1.10	4 28 14.6	+ 3.0	17 42.5
	0 39 46.80	2.62	2 35 18.9	19.9	5 15.9		0 57 59.79	+0.49	4 28 20.3	- 0.8	17 22.9
16	0 40 1.46	3.24	2 37 8.0	23.7	4 56.6	20	0 58 0.73	-0.11	4 28 7.1	4.5	17 3.2
21	0 40 19.13	3.83	2 39 15.7	27.4	4 37.2	25	0 57 58.67	0.71	4 27 35.4	8.2	16 43.4
26	0 40 39.69	4.39	2 41 41.3	30.8	4 17.9	30	0 57 53.62	1.31	4 26 45.3	11.8	16 23.7
31	0 41 3.02	4.93	2 44 23.8	34.1	3 58.6	Aug. 4	0 57 45.62	1.89	4 25 37.3	15.3	16 3.9
Feb. 5	0 41 29.00	5.45	2 47 22.3	37.2	3 39.4	9	0 57 34.76	2.45	4 24 12.1	18.7	15 44.1
10	0 41 57.44	5.92	2 50 35.5	40.0	3 20.2	14	0 57 21.17	2.98	4 22 30.4	21.9	15 24.2
15	0 42 28.16	6.36	2 54 2.2	42.6	3 1.0	19	0 57 4.98	3.49	4 20 33.3	24.9	15 4.3
20	0 43 0.98	6.76	2 57 41.1	44.9	2 41.9	24	0 56 46.32	3.97	4 18 21.7	27.7	14 44.3
25	0 43 35.69	7.12	3 1 30.8	46.9	2 22.9	29	0 56 25.35	4.41	4 15 56.7	30.2	14 24.3
Mar. 2	0 44 12.10	7.44	3 5 29.9	48.7	2 3.8	Sept. 3	0 56 2.26	4.81	4 13 19.6	32.5	14 4.2
7	0 44 50.00	7.71	3 9 37.1	50.1	1 44.8	8	0 55 37.28	5.17	4 10 31.8	34.5	13 44.1
12	0 45 29.14	7.94	3 13 50.7	51.3	1 25.8	13	0 55 10.67	5.47	4 7 35.1	36.1	13 24.0
17	0 46 9.29	8.12	3 18 9.2	52.1	1 6.8	18	0 54 42.66	5.72	4 4 30.9	37.5	13 3.9
22	0 46 50.23	8.25	3 22 31.2	52.6	0 47.8	23	0 54 13.50	5.93	4 1 20.9	38.4	12 43.7
27	0 47 31.73	8.34	3 26 55.2	52.9	0 28.8	28	0 53 43.47	6.07	3 58 7.1	39.0	12 23.6
Apr. 1	0 48 13.57	8.39	3 31 19.6	52.8	0 9.9	Oct. 3	0 53 12.88	6.15	3 54 51.2	39.2	12 3.5
6	0 48 55.51	8.38	3 35 43.2	52.5	23 47.1	8	0 52 42.03	6.17	3 51 35.3	39.1	11 43.3
11	0 49 37.31	8.33	3 40 4.3	51.9	23 28.1	13	0 52 11.24	6.14	3 48 21.2	38.5	11 23.1
16	0 50 18.72	8.23	3 44 21.4	50.9	23 9.2	18	0 51 40.77	6.04	3 45 10.8	37.6	11 2.9
21	0 50 59.54	8.09	3 48 33.2	49.7	22 50.2	23	0 51 10.96	5.88	3 42 6.0	36.3	10 42.8
26	0 51 39.56	7.91	3 52 38.4	48.3	22 31.2	28	0 50 42.09	5.66	3 39 8.6	34.6	10 22.7
May 1	0 52 18.56	7.68	3 56 35.7	46.6	22 12.2	Nov. 2	0 50 14.47	5.38	3 36 20.6	32.5	10 2.6
6	0 52 56.32	7.41	4 0 23.8	44.6	21 53.2	7	0 49 48.38	5.05	3 33 43.7	30.2	9 42.4
11	0 53 32.64	7.11	4 4 1.4	42.4	21 34.1	12	0 49 24.09	4.66	3 31 19.4	27.5	9 22.4
16	0 54 7.31	6.76	4 7 27.4	40.0	21 15.0	17	0 49 1.83	4.23	3 29 9.3	24.5	9 2.4
21	0 54 40.16	6.38	4 10 40.7	37.3	20 56.0	22	0 48 41.83	3.76	3 27 14.6	21.3	8 42.4
26	0 55 11.04	5.96	4 13 40.4	34.5	20 36.8	27	0 48 24.32	3.24	3 25 36.7	17.8	8 22.5
31	0 55 39.75	5.52	4 16 25.5	31.5	20 17.6	Dec. 2	0 48 9.48	2.69	3 24 16.6	14.2	8 2.5
June 5	0 56 6.14	5.04	4 18 55.0	28.3	19 58.3	7	0 47 57.48	2.11	3 23 15.3	10.3	7 42.7
10	0 56 30.06	4.53	4 21 8.3	25.0	19 39.1	12	0 47 48.44	1.51	3 22 33.4	6.4	7 22.8
15	0 56 51.39	4.00	4 23 4.6	21.5	19 19.8	17	0 47 42.46	0.89	3 22 11.4	- 2.4	7 3.1
20	0 57 10.02	3.45	4 24 43.3	18.0	19 0.4	22	0 47 39.61	-0.25	3 22 9.7	+ 1.7	6 43.4
25	0 57 25.87	2.88	4 26 4.1	14.3	18 40.9	27	0 47 39.97	+0.39	3 22 28.6	5.8	6 23.7
30	0 57 38.83	+2.30	+4 27 6.5	+10.6	18 21.5	32	0 47 43.57	+1.04	+3 23 08.0	+ 9.9	6 4.2

(From Professor Newcomb's Tables.)

# NEPTUNE, 1868.

## WASHINGTON MEAN TIME.

Date.	Apparent Right Ascension.	Var. for 1 day.	Apparent Declina- tion.	Var. for 1 day.	Meridian Passage.	Date.	Apparent Right Ascension.	Var. for 1 day.	Apparent Declina- tion.	Var. for 1 day.	Meridian Passage.
1868.	Noon.	Noon.	Noon.	Noon.		1868.	Noon.	Noon.	Noon.	Noon.	
Jan. 1	h m s	s	° ' "	"	h m	July 4	h m s	s	° ' "	"	h m
6	0 47 43.57	+1.04	+3 23 8.0	+ 9.9	6 4.2	9	1 6 6.84	+2.02	+5 17 33.9	+ 8.6	18 11.2
11	0 47 50.40	1.68	3 24 7.8	14.0	5 44.6	14	1 6 15.43	1.42	5 18 7.6	4.9	17 51.7
	0 48 0.40	2.32	3 25 27.6	17.9	5 25.1	19	1 6 20.99	0.81	5 18 22.6	+ 1.1	17 32.2
16	0 48 13.54	2.94	3 27 6.9	21.8	5 5.6	24	1 6 23.50	+0.20	5 18 18.9	- 2.6	17 12.5
21	0 48 29.74	3.54	3 29 5.1	25.5	4 46.3	29	1 6 22.97	-0.41	5 17 56.5	6.3	16 52.8
26	0 48 48.91	4.12	3 31 21.5	29.0	4 26.9	31	1 6 19.42	1.01	5 17 15.7	10.0	16 33.1
31	0 49 10.94	4.68	3 33 55.2	32.4	4 7.7	Aug. 3	1 6 12.89	1.60	5 16 17.0	13.5	16 13.3
Feb. 5	0 49 35.68	5.20	3 36 45.1	35.5	3 48.3	8	1 6 3.47	2.17	5 15 1.0	16.9	15 53.4
10	0 50 2.94	5.69	3 39 50.1	38.4	3 29.3	13	1 5 51.24	2.72	5 13 28.4	20.1	15 33.5
15	0 50 32.58	6.15	3 43 9.1	41.1	3 9.9	18	1 5 36.20	3.25	5 11 39.8	23.2	15 13.6
20	0 51 4.44	6.58	3 46 40.9	43.5	2 50.8	23	1 5 18.80	3.75	5 9 36.3	26.1	14 53.7
25	0 51 38.31	6.96	3 50 24.0	45.7	2 31.8	28	1 4 58.90	4.21	5 7 18.9	28.8	14 33.7
Mar. 1	0 52 13.98	7.30	3 54 17.1	47.5	2 12.7	Sept. 2	1 4 36.79	4.63	5 4 49.0	31.1	14 13.7
6	0 52 51.23	7.59	3 58 18.7	49.1	1 53.7	7	1 4 12.68	5.01	5 1 7.9	33.2	13 53.7
11	0 53 29.82	7.84	4 2 27.4	50.4	1 34.7	12	1 3 46.79	5.34	4 59 17.0	35.1	13 33.6
16	0 54 9.56	8.05	4 6 41.8	51.3	1 15.7	17	1 3 19.34	5.63	4 56 17.8	36.5	13 13.5
21	0 54 50.23	8.21	4 11 0.3	52.0	0 56.7	22	1 2 50.60	5.86	4 53 12.1	37.7	12 53.4
26	0 55 31.59	8.32	4 15 21.5	52.4	0 37.7	27	1 2 20.87	6.02	4 50 1.7	38.4	12 33.2
31	0 56 13.38	8.39	4 19 43.8	52.5	0 18.7	Oct. 2	1 1 50.44	6.14	4 46 48.4	38.8	12 13.0
Apr. 5	0 56 55.37	8.40	4 24 5.8	52.3	23 56.0	7	1 1 19.58	6.19	4 43 34.0	38.8	11 52.8
10	0 57 37.34	8.38	4 28 26.0	51.8	23 37.0	12	1 0 48.60	6.19	4 40 20.5	38.5	11 32.6
15	0 58 19.07	8.31	4 32 43.0	51.0	23 18.1	17	1 0 17.80	6.12	4 37 9.7	37.8	11 12.4
20	0 59 0.34	8.19	4 36 55.5	50.0	22 59.1	22	0 59 47.51	5.99	4 34 3.5	36.6	10 52.3
25	0 59 40.91	8.03	4 41 2.0	48.6	22 40.1	27	0 59 18.04	5.79	4 31 4.0	35.1	10 32.1
30	1 0 20.54	7.82	4 45 1.1	47.0	22 21.1	Nov. 1	0 58 49.68	5.54	4 28 12.9	33.3	10 12.0
May 5	1 0 59.04	7.57	4 48 51.7	45.2	22 2.1	6	0 58 22.69	5.24	4 25 31.9	31.1	9 51.9
10	1 1 36.20	7.29	4 52 32.5	43.1	21 43.0	11	0 57 57.37	4.88	4 23 2.6	28.6	9 31.8
15	1 2 11.83	6.96	4 56 2.5	40.8	21 24.0	16	0 57 33.97	4.47	4 20 46.6	25.8	9 11.8
20	1 2 45.74	6.60	4 59 20.4	38.3	21 4.8	21	0 57 12.75	4.01	4 18 45.4	22.6	8 51.8
25	1 3 17.75	6.20	5 2 25.3	35.6	20 45.7	26	0 56 53.94	3.51	4 17 0.4	19.3	8 31.8
30	1 3 47.66	5.76	5 5 16.0	32.7	20 26.6	Dec. 1	0 56 37.71	2.98	4 15 32.6	15.8	8 11.9
June 4	1 4 15.32	5.30	5 7 51.7	29.6	20 7.4	6	0 56 24.22	2.41	4 14 22.9	12.1	7 51.9
9	1 4 40.60	4.81	5 10 11.8	26.4	19 48.1	11	0 56 13.63	1.82	4 13 32.1	8.2	7 32.1
14	1 5 3.36	4.29	5 12 15.5	23.0	19 28.9	16	0 56 6.09	1.20	4 13 0.9	4.2	7 12.4
19	1 5 23.47	3.75	5 14 2.0	19.6	19 9.5	21	0 56 1.68	-0.56	4 12 49.8	- 0.2	6 52.7
24	1 5 40.81	3.19	5 15 30.9	16.0	18 50.1	26	0 56 0.46	+0.08	4 12 59.0	+ 3.9	6 33.0
29	1 5 55.20	+2.61	+5 16 41.6	+12.3	18 30.7	31	0 56 2.45	+0.72	+4 13 28.5	+ 7.9	6 13.4

(From Professor Newcomb's Tables.)

# NEPTUNE, 1869.

## WASHINGTON MEAN TIME.

Date.	Apparent Right Ascension.	Var. for 1 hour.	Apparent Declina- tion.	Var. for 1 hour.	Meridian Passage.	Date.	Apparent Right Ascension.	Var. for 1 hour.	Apparent Declina- tion.	Var. for 1 hour.	Meridian Passage.
1869.	Noon.	Noon.	Noon.	Noon.		1869.	Noon.	Noon.	Noon.	Noon.	
Jan. 1	h m s 3.24	+0.35	° ' " 4 13 36.8	+0.37	h m s 6 9.5	Feb. 19	h m s 0 59 9.80	+0.266	° ' " 4 35 30.2	+1.75	h m s 2 59.9
2	0 56 4.15	.040	4 13 46.0	0.40	6 5.6	20	0 59 16.23	.270	4 36 12.5	1.77	2 56.1
3	0 56 5.19	.046	4 13 56.0	0.43	6 1.7	21	0 59 22.75	.273	4 36 55.2	1.79	2 52.3
4	0 56 6.36	.052	4 14 6.7	0.46	5 57.7	22	0 59 29.34	.276	4 37 38.4	1.81	2 48.5
5	0 56 7.66	.057	4 14 18.3	0.50	5 53.8	23	0 59 36.01	.280	4 38 22.0	1.83	2 44.7
6	0 56 9.09	.062	4 14 30.7	0.53	5 49.9	24	0 59 42.76	.283	4 39 6.1	1.85	2 40.8
7	0 56 10.65	.067	4 14 43.8	0.57	5 46.0	25	0 59 49.59	.286	4 39 50.6	1.87	2 37.0
8	0 56 12.33	.073	4 14 57.8	0.60	5 42.1	26	0 59 56.49	.289	4 40 35.5	1.88	2 33.2
9	0 56 14.15	.079	4 15 12.6	0.63	5 38.2	27	1 0 3.46	.292	4 41 20.8	1.90	2 29.4
10	0 56 16.09	.084	4 15 28.1	0.67	5 34.3	28	1 0 10.50	.295	4 42 6.4	1.91	2 25.6
11	0 56 18.16	.089	4 15 44.5	0.70	5 30.4	Mar. 1	1 0 17.61	.298	4 42 52.5	1.92	2 21.8
12	0 56 20.36	.094	4 16 1.6	0.73	5 26.5	2	1 0 24.79	.301	4 43 38.9	1.94	2 18.0
13	0 56 22.68	.099	4 16 19.5	0.76	5 22.6	3	1 0 32.04	.303	4 44 25.7	1.96	2 14.1
14	0 56 25.13	.105	4 16 38.2	0.80	5 18.7	4	1 0 39.35	.306	4 45 12.8	1.97	2 10.3
15	0 56 27.71	.110	4 16 57.6	0.83	5 14.8	5	1 0 46.72	.308	4 46 0.3	1.98	2 6.5
16	0 56 30.41	.115	4 17 17.8	0.86	5 10.9	6	1 0 54.16	.311	4 46 48.1	2.00	2 2.7
17	0 56 33.24	.120	4 17 38.8	0.89	5 7.0	7	1 1 1.66	.314	4 47 36.2	2.01	1 58.9
18	0 56 36.19	.125	4 18 0.5	0.92	5 3.2	8	1 1 9.21	.316	4 48 24.6	2.02	1 55.1
19	0 56 39.25	.130	4 18 22.9	0.95	4 59.3	9	1 1 16.82	.318	4 49 13.2	2.03	1 51.3
20	0 56 42.45	.135	4 18 46.1	0.98	4 55.4	10	1 1 24.48	.320	4 50 2.2	2.05	1 47.5
21	0 56 45.77	.140	4 19 10.0	1.01	4 51.6	11	1 1 32.20	.323	4 50 51.4	2.06	1 43.7
22	0 56 49.20	.145	4 19 34.7	1.04	4 47.7	12	1 1 39.97	.325	4 51 40.9	2.07	1 39.9
23	0 56 52.75	.150	4 20 0.1	1.07	4 43.8	13	1 1 47.78	.327	4 52 30.6	2.08	1 36.1
24	0 56 56.42	.155	4 20 26.2	1.10	4 39.9	14	1 1 55.65	.329	4 53 20.6	2.09	1 32.3
25	0 57 0.21	.160	4 20 53.0	1.13	4 36.0	15	1 2 3.56	.331	4 54 10.7	2.10	1 28.5
26	0 57 4.12	.165	4 21 20.5	1.16	4 32.2	16	1 2 11.51	.332	4 55 1.1	2.10	1 24.7
27	0 57 8.13	.170	4 21 48.8	1.19	4 28.3	17	1 2 19.51	.334	4 55 51.7	2.11	1 20.9
28	0 57 12.27	.175	4 22 17.7	1.22	4 24.5	18	1 2 27.54	.335	4 56 42.4	2.12	1 17.1
29	0 57 16.51	.179	4 22 47.2	1.25	4 20.6	19	1 2 35.61	.337	4 57 33.3	2.12	1 13.3
30	0 57 20.87	.184	4 23 17.5	1.28	4 16.8	20	1 2 43.71	.338	4 58 24.3	2.13	1 9.5
31	0 57 25.34	.188	4 23 48.4	1.30	4 12.9	21	1 2 51.85	.340	4 59 15.5	2.13	1 5.7
Feb. 1	0 57 29.92	.193	4 24 20.0	1.33	4 9.0	22	1 3 0.02	.341	5 0 6.8	2.14	1 1.9
2	0 57 34.61	.198	4 24 52.2	1.35	4 5.2	23	1 3 8.21	.342	5 0 58.2	2.15	0 58.1
3	0 57 39.40	.202	4 25 25.0	1.38	4 1.3	24	1 3 16.44	.343	5 1 49.7	2.15	0 54.3
4	0 57 44.30	.207	4 25 58.5	1.41	3 57.5	25	1 3 24.68	.344	5 2 41.3	2.15	0 50.5
5	0 57 49.31	.211	4 26 32.6	1.43	3 53.6	26	1 3 32.96	.345	5 3 33.0	2.16	0 46.7
6	0 57 54.42	.215	4 27 7.3	1.46	3 49.8	27	1 3 41.26	.346	5 4 24.8	2.16	0 42.9
7	0 57 59.63	.219	4 27 42.6	1.48	3 46.0	28	1 3 49.58	.347	5 5 16.6	2.16	0 39.1
8	0 58 4.95	.224	4 28 18.5	1.51	3 42.1	29	1 3 57.91	.348	5 6 8.5	2.16	0 35.3
9	0 58 10.37	.228	4 28 55.0	1.53	3 38.2	30	1 4 6.27	.349	5 7 0.4	2.17	0 31.5
10	0 58 15.89	.232	4 29 32.1	1.55	3 34.4	31	1 4 14.64	.349	5 7 52.4	2.17	0 27.7
11	0 58 21.51	.236	4 30 9.7	1.58	3 30.5	Apr. 1	1 4 23.03	.350	5 8 44.4	2.17	0 23.9
12	0 58 27.23	.240	4 30 47.9	1.60	3 26.7	2	1 4 31.43	.350	5 9 36.4	2.17	0 20.1
13	0 58 33.08	.244	4 31 26.7	1.63	3 22.9	3	1 4 39.83	.350	5 10 28.3	2.17	0 16.3
14	0 58 38.94	.248	4 32 6.0	1.65	3 19.0	4	1 4 48.25	.351	5 11 20.3	2.17	0 12.6
15	0 58 44.94	.252	4 32 45.8	1.67	3 15.2	5	1 4 56.67	.351	5 12 12.2	2.16	0 8.8
16	0 58 51.02	.255	4 33 26.2	1.69	3 11.4	6	1 5 5.10	.351	5 13 4.1	2.16	0 5.0
17	0 58 57.19	.259	4 34 7.0	1.71	3 7.6	7	1 5 13.52	.351	5 13 55.9	2.16	0 1.2
18	0 59 3.45	.263	4 34 48.4	1.73	3 3.7	8	1 5 21.95	.351	5 14 47.7	2.15	23 57.3
19	0 59 9.80	+0.266	4 35 30.2	+1.75	2 59.9	9	1 5 30.37	+0.351	5 15 39.4	+2.15	23 49.7

(From Professor Nowcomb's Tables.)

# NEPTUNE, 1869.

## WASHINGTON MEAN TIME.

Date.	Apparent Right Ascension.	Var. for 1 hour.	Apparent Declina- tion.	Var. for 1 hour.	Meridian Passage.	Date.	Apparent Right Ascension.	Var. for 1 hour.	Apparent Declina- tion.	Var. for 1 hour.	Meridian Passage.
1869.	Noon.	Noon.	Noon.	Noon.		1869.	Noon.	Noon.	Noon.	Noon.	
Apr. 9	h m s	s	° ' "	"	h m	May 28	h m s	s	° ' "	"	h m
10	1 5 30.37	+351	+5 15 39.4	+2.15	23 49.7	29	1 11 44.37	+257	+5 52 34.2	+1.45	20 43.2
11	1 5 38.80	.351	5 16 31.0	2.15	23 45.9	30	1 11 50.51	.254	5 53 8.7	1.43	20 39.4
12	1 5 47.22	.351	5 17 22.5	2.14	23 42.1	31	1 11 56.56	.250	5 53 42.8	1.41	20 35.6
13	1 5 55.63	.350	5 18 13.9	2.14	23 38.3	June 1	1 12 2.53	.247	5 54 16.3	1.38	20 31.8
14	1 6 4.03	.350	5 19 5.1	2.13	23 34.5	2	1 12 8.40	.243	5 54 49.2	1.36	20 27.9
15	1 6 12.42	.349	5 19 56.2	2.13	23 30.7	3	1 12 14.19	.239	5 55 21.5	1.33	20 24.1
16	1 6 20.80	.349	5 20 47.2	2.12	23 26.9	4	1 12 19.89	.235	5 55 53.2	1.31	20 20.2
17	1 6 29.17	.348	5 21 38.0	2.12	23 23.1	5	1 12 25.50	.232	5 56 24.3	1.28	20 16.4
18	1 6 37.51	.347	5 22 28.7	2.11	23 19.3	6	1 12 31.02	.228	5 56 54.8	1.26	20 12.6
19	1 6 45.84	.347	5 23 19.1	2.10	23 15.5	7	1 12 36.44	.224	5 57 24.7	1.23	20 8.7
20	1 6 54.15	.346	5 24 9.4	2.09	23 11.7	8	1 12 41.77	.220	5 57 54.0	1.21	20 4.9
21	1 7 2.44	.345	5 24 59.5	2.08	23 7.9	9	1 12 47.00	.216	5 58 22.7	1.18	20 1.0
22	1 7 10.70	.344	5 25 49.4	2.07	23 4.2	10	1 12 52.13	.212	5 58 50.7	1.15	19 57.2
23	1 7 18.94	.343	5 26 39.0	2.06	23 0.4	11	1 12 57.16	.207	5 59 18.1	1.13	19 53.3
24	1 7 27.15	.342	5 27 28.3	2.05	22 56.6	12	1 13 2.09	.203	5 59 44.8	1.10	19 49.5
25	1 7 35.33	.340	5 28 17.5	2.04	22 52.8	13	1 13 6.92	.199	6 0 10.8	1.07	19 45.6
26	1 7 43.48	.339	5 29 6.4	2.03	22 49.0	14	1 13 11.65	.195	6 0 36.2	1.05	19 41.8
27	1 7 51.60	.338	5 29 55.1	2.02	22 45.2	15	1 13 16.27	.190	6 1 1.0	1.02	19 37.9
28	1 7 59.68	.336	5 30 43.4	2.01	22 41.4	16	1 13 20.79	.186	6 1 25.1	0.99	19 34.1
29	1 8 7.73	.335	5 31 31.5	2.00	22 37.6	17	1 13 25.20	.182	6 1 48.5	0.96	19 30.2
30	1 8 15.74	.333	5 32 19.3	1.99	22 33.8	18	1 13 29.51	.177	6 2 11.2	0.93	19 26.4
May 1	1 8 23.71	.331	5 33 6.8	1.98	22 30.0	19	1 13 33.71	.173	6 2 33.3	0.90	19 22.5
2	1 8 31.64	.330	5 33 54.0	1.96	22 26.2	20	1 13 37.81	.168	6 2 54.7	0.87	19 18.6
3	1 8 39.53	.328	5 34 40.8	1.94	22 22.4	21	1 13 41.80	.164	6 3 15.4	0.85	19 14.7
4	1 8 47.38	.326	5 35 27.3	1.93	22 18.6	22	1 13 45.67	.159	6 3 35.4	0.82	19 10.9
5	1 8 55.17	.324	5 36 13.5	1.92	22 14.8	23	1 13 49.44	.155	6 3 54.7	0.79	19 7.0
6	1 9 2.93	.322	5 36 59.3	1.90	22 11.0	24	1 13 53.09	.150	6 4 13.3	0.76	19 3.2
7	1 9 10.64	.320	5 37 44.8	1.89	22 7.2	25	1 13 56.64	.145	6 4 31.2	0.73	18 59.3
8	1 9 18.29	.318	5 38 29.9	1.87	22 3.4	26	1 14 0.07	.141	6 4 48.4	0.70	18 55.4
9	1 9 25.89	.316	5 39 14.6	1.85	21 59.6	27	1 14 3.39	.136	6 5 4.9	0.67	18 51.5
10	1 9 33.44	.313	5 39 58.9	1.84	21 55.8	28	1 14 6.59	.131	6 5 20.7	0.64	18 47.6
11	1 9 40.93	.311	5 40 42.8	1.82	21 52.0	29	1 14 9.68	.126	6 5 35.7	0.61	18 43.7
12	1 9 48.36	.308	5 41 26.3	1.80	21 48.1	30	1 14 12.66	.122	6 5 50.1	0.58	18 39.9
13	1 9 55.73	.306	5 42 9.4	1.79	21 44.3	July 1	1 14 15.52	.117	6 6 3.7	0.55	18 36.0
14	1 10 3.04	.303	5 42 52.0	1.77	21 40.5	2	1 14 18.26	.112	6 6 16.6	0.52	18 32.1
15	1 10 10.29	.301	5 43 34.2	1.75	21 36.7	3	1 14 20.89	.107	6 6 28.8	0.50	18 28.2
16	1 10 17.48	.298	5 44 16.0	1.73	21 32.9	4	1 14 23.40	.102	6 6 40.3	0.46	18 24.3
17	1 10 24.60	.295	5 44 57.3	1.71	21 29.1	5	1 14 25.79	.097	6 6 51.0	0.43	18 20.4
18	1 10 31.65	.293	5 45 38.1	1.69	21 25.3	6	1 14 28.06	.092	6 7 1.0	0.40	18 16.5
19	1 10 38.63	.290	5 46 18.4	1.67	21 21.5	7	1 14 30.22	.087	6 7 10.2	0.37	18 12.6
20	1 10 45.55	.287	5 46 58.3	1.65	21 17.7	8	1 14 32.25	.082	6 7 18.7	0.34	18 8.7
21	1 10 52.39	.283	5 47 37.7	1.63	21 13.8	9	1 14 34.16	.077	6 7 26.5	0.31	18 4.8
22	1 10 59.16	.280	5 48 16.6	1.61	21 10.0	10	1 14 35.95	.072	6 7 33.5	0.28	18 0.9
23	1 11 5.85	.277	5 48 55.0	1.59	21 6.2	11	1 14 37.62	.067	6 7 39.8	0.25	17 57.0
24	1 11 12.47	.274	5 49 32.8	1.57	21 2.4	12	1 14 39.16	.062	6 7 45.3	0.21	17 53.1
25	1 11 19.01	.271	5 50 10.2	1.55	20 58.6	13	1 14 40.59	.057	6 7 50.1	0.18	17 49.2
26	1 11 25.47	.267	5 50 47.0	1.53	20 54.7	14	1 14 41.89	.052	6 7 54.1	0.15	17 45.3
27	1 11 31.85	.264	5 51 23.3	1.50	20 50.9	15	1 14 43.07	.047	6 7 57.4	0.12	17 41.4
28	1 11 38.15	.261	5 51 59.0	1.48	20 47.0	16	1 14 44.13	.042	6 7 59.9	0.09	17 37.5
29	1 11 44.37	+257	+5 52 34.2	+1.45	20 43.2						

(From Professor Newcomb's Tables.)

# NEPTUNE, 1869.

## WASHINGTON MEAN TIME.

Date.	Apparent Right Ascension.		Var. for 1 hour.	Apparent Declination.		Var. for 1 hour.	Meridian Passage.	Date.	Apparent Right Ascension.		Var. for 1 hour.	Apparent Declination.		Var. for 1 hour.	Meridian Passage.
	Noon.	Noon.		Noon.	Noon.				Noon.	Noon.		Noon.	Noon.		
1869.								1869.							
July 16	h m s	s		° ' "	"		h m	Sept. 3	h m s	s		° ' "	"		h m
17	1 14 45.07	+0.37		6 8 1.7	+0.06		17 33.6	4	1 13 8.08	-1.88		5 55 22.3	-1.26		14 19.3
18	1 14 45.88	.032		6 8 2.8	+0.03		17 29.7	5	1 13 3.51	.192		5 54 51.9	1.28		14 15.3
19	1 14 46.58	.027		6 8 3.1	0.00		17 25.7	6	1 12 58.86	.195		5 54 21.0	1.39		14 11.3
20	1 14 47.15	.021		6 8 2.7	-0.03		17 21.8	7	1 12 54.14	.199		5 53 49.7	1.31		14 7.3
21	1 14 47.63	.016		6 8 1.5	0.06		17 17.9	8	1 12 49.33	.202		5 53 18.0	1.33		14 3.3
22	1 14 47.93	.011		6 7 59.7	0.09		17 14.0	9	1 12 44.45	.205		5 52 45.8	1.35		13 59.2
23	1 14 48.13	.006		6 7 57.0	0.12		17 10.0	10	1 12 39.49	.208		5 52 13.3	1.37		13 55.2
24	1 14 48.22	+0.01		6 7 53.7	0.15		17 6.1	11	1 12 34.46	.211		5 51 40.3	1.38		13 51.2
25	1 14 48.18	-.004		6 7 49.6	0.19		17 2.2	12	1 12 29.36	.214		5 51 7.0	1.40		13 47.2
26	1 14 48.02	.009		6 7 44.8	0.22		16 58.2	13	1 12 24.19	.217		5 50 33.3	1.41		13 43.2
27	1 14 47.74	.014		6 7 39.2	0.25		16 54.3	14	1 12 18.95	.220		5 49 59.2	1.43		13 39.2
28	1 14 47.34	.019		6 7 33.0	0.28		16 50.3	15	1 12 13.65	.222		5 49 24.9	1.44		13 35.1
29	1 14 46.81	.024		6 7 26.0	0.30		16 46.4	16	1 12 8.29	.225		5 48 50.2	1.45		13 31.1
30	1 14 46.17	.029		6 7 18.3	0.33		16 42.5	17	1 12 2.87	.227		5 48 15.1	1.47		13 27.0
31	1 14 45.41	.034		6 7 9.9	0.36		16 38.5	18	1 11 57.38	.230		5 47 39.8	1.48		13 23.0
Aug. 1	1 14 44.52	.039		6 7 0.8	0.40		16 34.6	19	1 11 51.84	.232		5 47 4.2	1.49		13 19.0
2	1 14 43.52	.044		6 6 50.9	0.43		16 30.6	20	1 11 46.25	.234		5 46 28.3	1.50		13 15.0
3	1 14 42.40	.049		6 6 40.4	0.45		16 26.7	21	1 11 40.61	.236		5 45 52.1	1.51		13 11.0
4	1 14 41.16	.054		6 6 29.1	0.49		16 22.7	22	1 11 34.91	.238		5 45 15.7	1.52		13 7.0
5	1 14 39.83	.059		6 6 17.1	0.51		16 18.8	23	1 11 29.17	.240		5 44 39.1	1.53		13 3.0
6	1 14 38.32	.064		6 6 4.5	0.54		16 14.8	24	1 11 23.38	.242		5 44 2.2	1.54		12 58.9
7	1 14 36.72	.069		6 5 51.1	0.57		16 10.9	25	1 11 17.54	.244		5 43 25.1	1.55		12 54.9
8	1 14 35.01	.074		6 5 37.0	0.60		16 6.9	26	1 11 11.67	.245		5 42 47.9	1.56		12 50.9
9	1 14 33.18	.079		6 5 22.3	0.63		16 3.0	27	1 11 5.76	.247		5 42 10.4	1.56		12 46.8
10	1 14 31.23	.083		6 5 6.9	0.66		15 59.0	28	1 10 59.80	.249		5 41 32.8	1.57		12 42.8
11	1 14 29.17	.088		6 4 50.8	0.68		15 55.0	29	1 10 53.81	.250		5 40 55.0	1.58		12 38.8
12	1 14 27.00	.093		6 4 34.1	0.71		15 51.1	30	1 10 47.79	.252		5 40 17.1	1.58		12 34.8
13	1 14 24.71	.098		6 4 16.7	0.74		15 47.1	1	1 10 41.74	.253		5 39 39.1	1.59		12 30.7
14	1 14 22.31	.103		6 3 58.6	0.77		15 43.1	2	1 10 35.66	.254		5 39 1.0	1.59		12 26.7
15	1 14 19.80	.107		6 3 39.9	0.80		15 39.1	3	1 10 29.55	.255		5 38 22.7	1.60		12 22.7
16	1 14 17.18	.112		6 3 20.5	0.82		15 35.2	4	1 10 23.42	.256		5 37 44.3	1.60		12 18.6
17	1 14 14.45	.116		6 3 0.5	0.85		15 31.2	5	1 10 17.27	.257		5 37 5.9	1.60		12 14.6
18	1 14 11.61	.120		6 2 39.9	0.87		15 27.2	6	1 10 11.10	.258		5 36 27.5	1.60		12 10.5
19	1 14 8.67	.125		6 2 18.7	0.90		15 23.2	7	1 10 4.92	.258		5 35 49.0	1.60		12 6.5
20	1 14 5.62	.129		6 1 56.9	0.92		15 19.2	8	1 9 58.72	.258		5 35 10.5	1.60		12 2.5
21	1 13 2.47	.133		6 1 34.5	0.95		15 15.3	9	1 9 52.51	.259		5 34 32.0	1.60		11 58.4
22	1 13 59.22	.138		6 1 11.5	0.97		15 11.3	10	1 9 46.29	.259		5 33 53.5	1.60		11 54.4
23	1 13 55.87	.142		6 0 47.9	1.00		15 7.3	11	1 9 40.07	.259		5 33 15.0	1.60		11 50.4
24	1 13 52.41	.146		6 0 23.7	1.02		15 3.3	12	1 9 33.85	.260		5 32 36.6	1.60		11 46.3
25	1 13 48.85	.150		5 59 59.0	1.04		14 59.3	13	1 9 27.62	.260		5 31 58.2	1.60		11 42.3
26	1 13 45.20	.155		5 59 33.7	1.07		14 55.3	14	1 9 21.39	.259		5 31 19.9	1.60		11 38.3
27	1 13 41.44	.158		5 59 7.8	1.09		14 51.3	15	1 9 15.17	.259		5 30 41.7	1.59		11 34.2
28	1 13 37.60	.162		5 58 41.4	1.11		14 47.3	16	1 9 8.97	.259		5 30 3.6	1.59		11 30.2
29	1 13 33.65	.167		5 58 14.5	1.13		14 43.3	17	1 9 2.76	.258		5 29 25.6	1.58		11 26.2
30	1 13 29.61	.170		5 57 47.0	1.15		14 39.3	18	1 8 56.57	.258		5 28 47.8	1.57		11 22.1
31	1 13 25.48	.174		5 57 19.1	1.18		14 35.3	19	1 8 50.39	.257		5 28 10.1	1.57		11 18.1
Sept. 1	1 13 21.26	.178		5 56 50.6	1.20		14 31.3	20	1 8 44.24	.256		5 27 32.6	1.56		11 14.0
2	1 13 16.96	.181		5 56 21.7	1.22		14 27.3	21	1 8 38.10	.255		5 26 55.3	1.55		11 10.0
3	1 13 12.56	.185		5 55 52.2	1.24		14 23.3	22	1 8 31.98	.255		5 26 18.1	1.54		11 6.0
4	1 13 8.08	-.188		5 55 22.3	-1.26		14 19.3	23	1 8 25.89	-.253		5 25 41.2	-1.53		11 2.0

(From Professor Nowcomb's Tables.)



# NEPTUNE, 1869.

## WASHINGTON MEAN TIME.

Date.	Apparent Right Ascension.	Var. for 1 hour.	Apparent Declina- tion.	Var. for 1 hour.	Meridian Passage.	Date.	Apparent Right Ascension.	Var. for 1 hour.	Apparent Declina- tion.	Var. for 1 hour.	Meridian Passage.
1869.	Noon.	Noon.	Noon.	Noon.		1869.	Noon.	Noon.	Noon.	Noon.	
Oct. 22	h m s	s	° ' "	"	h m	Nov. 26	h m s	s	° ' "	"	h m
23	1 8 25.89	-.253	+5 25 41.2	-1.53	11 2.0	27	1 5 25.63	-.158	+5 8 8.6	-.86	8 41.3
24	1 8 19.82	.252	5 25 4.5	1.52	10 57.9	28	1 5 21.90	.153	5 7 48.2	0.83	8 37.3
25	1 8 13.78	.251	5 24 28.0	1.52	10 53.9	29	1 5 18.27	.149	5 7 28.5	0.81	8 33.4
26	1 8 7.78	.250	5 23 51.8	1.50	10 49.9	30	1 5 14.74	.145	5 7 9.4	0.78	8 29.4
	1 8 1.80	.248	5 23 15.9	1.49	10 45.8		1 5 11.32	.140	5 6 51.0	0.75	8 25.4
27	1 7 55.86	.247	5 22 40.2	1.48	10 41.8	Dec. 1	1 5 8.00	.136	5 6 33.3	0.72	8 21.4
28	1 7 49.95	.245	5 22 4.8	1.47	10 37.8	2	1 5 4.79	.131	5 6 16.3	0.69	8 17.4
29	1 7 44.09	.243	5 21 29.7	1.45	10 33.7	3	1 5 1.69	.127	5 6 0.0	0.66	8 13.4
30	1 7 38.28	.242	5 20 55.0	1.44	10 29.7	4	1 4 58.70	.122	5 5 44.4	0.63	8 9.4
31	1 7 32.50	.240	5 20 20.6	1.43	10 25.7	5	1 4 55.83	.117	5 5 29.6	0.60	8 5.5
Nov. 1	1 7 26.77	.238	5 19 46.5	1.41	10 21.7	6	1 4 53.06	.113	5 5 15.5	0.57	8 1.5
2	1 7 21.09	.235	5 19 12.8	1.40	10 17.6	7	1 4 50.41	.108	5 5 2.2	0.54	7 57.5
3	1 7 15.47	.233	5 18 39.4	1.38	10 13.6	8	1 4 47.87	.103	5 4 49.6	0.51	7 53.5
4	1 7 9.90	.231	5 18 6.5	1.36	10 9.6	9	1 4 45.45	.098	5 4 37.7	0.48	7 49.6
5	1 7 4.39	.228	5 17 34.0	1.35	10 5.6	10	1 4 43.15	.093	5 4 26.6	0.45	7 45.6
6	1 6 58.93	.226	5 17 1.9	1.33	10 1.5	11	1 4 40.97	.088	5 4 16.3	0.42	7 41.6
7	1 6 53.54	.223	5 16 30.2	1.31	9 57.5	12	1 4 38.91	.083	5 4 6.7	0.38	7 37.7
8	1 6 48.21	.221	5 15 59.0	1.29	9 53.5	13	1 4 36.97	.078	5 3 58.0	0.35	7 33.7
9	1 6 42.95	.218	5 15 28.3	1.27	9 49.5	14	1 4 35.16	.073	5 3 50.0	0.32	7 29.7
10	1 6 37.76	.215	5 14 58.1	1.25	9 45.5	15	1 4 33.46	.068	5 3 42.8	0.28	7 25.8
11	1 6 32.64	.212	5 14 28.3	1.23	9 41.4	16	1 4 31.89	.063	5 3 36.3	0.25	7 21.8
12	1 6 27.59	.209	5 13 59.0	1.21	9 37.4	17	1 4 30.44	.057	5 3 30.6	0.22	7 17.9
13	1 6 22.62	.205	5 13 30.3	1.19	9 33.4	18	1 4 29.15	.052	5 3 25.8	0.19	7 13.9
14	1 6 17.72	.202	5 13 2.1	1.17	9 29.4	19	1 4 27.92	.047	5 3 21.7	0.15	7 10.0
15	1 6 12.91	.199	5 12 34.4	1.14	9 25.4	20	1 4 26.84	.042	5 3 18.4	0.12	7 6.0
16	1 6 8.17	.195	5 12 7.3	1.12	9 21.4	21	1 4 25.89	.036	5 3 15.9	0.09	7 2.1
17	1 6 3.52	.192	5 11 40.7	1.10	9 17.4	22	1 4 25.06	.032	5 3 14.2	0.05	6 58.1
18	1 5 58.95	.189	5 11 14.7	1.07	9 13.3	23	1 4 24.36	.026	5 3 13.3	-.02	6 54.2
19	1 5 54.47	.185	5 10 49.3	1.05	9 9.3	24	1 4 23.79	.021	5 3 13.2	+0.01	6 50.2
20	1 5 50.08	.181	5 10 24.5	1.02	9 5.3	25	1 4 23.35	.016	5 3 13.9	0.05	6 46.3
21	1 5 45.77	.178	5 10 0.3	1.00	9 1.3	26	1 4 23.03	.010	5 3 15.4	0.08	6 42.3
22	1 5 41.55	.174	5 9 36.7	0.97	8 57.3	27	1 4 22.84	-.005	5 3 17.7	0.11	6 38.4
23	1 5 37.43	.170	5 9 13.7	0.95	8 53.3	28	1 4 22.79	.000	5 3 20.8	0.15	6 34.5
24	1 5 33.40	.166	5 8 51.4	0.92	8 49.3	29	1 4 22.86	+0.06	5 3 24.7	0.18	6 30.5
25	1 5 29.47	.162	5 8 29.7	0.89	8 45.3	30	1 4 23.06	.011	5 3 29.4	0.21	6 26.6
26	1 5 25.63	-.158	+5 8 8.6	-0.86	8 41.3	31	1 4 23.40	+0.07	+5 3 34.9	+0.25	6 22.7

## HORIZONTAL PARALLAX.

1866. Jan. 1 to Jan. 15,	.29
Jan. 15 to June 18,	.28
June 19 to Aug. 23,	.29
Aug. 23 to Nov. 15,	.30
Nov. 15 to Dec. 31,	.29
1867. Jan. 1 to Jan. 18,	.29
Jan. 18 to June 19,	.28
June 19 to Aug. 24,	.29
Aug. 24 to Nov. 16,	.30
Nov. 16 to Dec. 31,	.29

1868. Jan. 1 to Jan. 20,	.29
Jan. 20 to June 21,	.28
June 21 to Aug. 26,	.29
Aug. 26 to Nov. 19,	.30
Nov. 19 to Dec. 31,	.29
1869. Jan. 1 to Jan. 22,	.29
Jan. 22 to June 22,	.28
June 22 to Aug. 27,	.29
Aug. 27 to Nov. 21,	.30
Nov. 21 to Dec. 31,	.29

(From Professor Newcomb's Tables.)

# OCCULTATIONS, 1868.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date. 1868.	Star's Name and Magnitude.	Latitude.	IMMERSION.				EMERSON.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3
Jan. 4	B.A.C. 830 6	30° 35 40 45	14 3 14 1 14 2 14 6	13 57 13 55 13 57 14 2	13 50 13 48 13 51 13 56	13 40 13 39 13 42 13 49	15 2 14 58 14 50 14 36	15 1 14 57 14 49 14 35	14 58 14 54 14 46 14 33	14 52 14 49 14 41 14 27	16° 139 117 87	165 144 120 91	169 146 122 95	171° 147 123 93
6	θ Tauri 4½	30 35 40 45	8 52 8 35 8 34 8 36	8 23 8 19 8 22 8 26	8 7 8 8 8 13 8 19	7 57 8 1 8 7 8 14	8 52 9 2½ 9 35 9 46	8 55 9 13 9 26 9 36	8 53 9 8 9 18 9 27	8 50 9 1 9 11 9 21	Star 1' s.	113 121 110 103	94 85 77 87	80 71 65 73
6	θ Tauri 4½	30 35 40 45	..... ..... 8 48 8 43	..... 8 44 8 31 8 31	8 30 8 19 8 18 8 22	8 10 8 7 8 11 8 16	..... ..... 9 19 9 37	..... 8 44 9 16 9 30	8 30 8 55 9 11 9 23	8 36 8 54 9 6 9 17	Star 30'' s.	110 111 99 93	110 95 85 80	110 95 85 80
6	Rumk. 1210	30 35 40 45	8 38 8 42 8 47 8 55	8 25 8 31 8 38 8 47	8 16 8 23 8 32 8 42	8 9 8 17 8 27 8 39	9 47 9 57 10 3 10 5	9 36 9 44 9 50 9 52	9 25 9 32 9 38 9 40	9 16 9 22 9 26 9 28	96 91 85 73	74 68 63 54	58 52 47 38	45 39 32 23
6	B.A.C. 1391 5	30 35 40 45	9 40 9 37 9 38 9 43	9 21 9 22 9 26 9 33	9 5 9 9 9 16 9 24	8 54 9 0 9 9 9 18	10 35 10 49 10 54 10 59	10 24 10 36 10 42 10 46	10 13 10 23 10 29 10 34	10 3 10 11 10 17 10 21	146 150 117 104	107 103 95 85	83 79 73 67	67 61 55 49
6	B.A.C. 1394 7	30 35 40 45	10 4 9 49 9 42 9 49	9 35 9 31 9 33 9 37	9 16 9 17 9 22 9 28	9 2 9 6 9 13 9 21	10 24 10 48 10 59 11 5	10 20 10 37 10 46 10 52	10 13 10 25 10 34 10 40	10 5 10 15 10 23 10 28	161 147 132 118	122 115 107 97	97 91 86 79	79 74 68 62
6	B.A.C. 1406 7	30 35 40 45	11 52 11 34 11 28 11 26	11 26 11 14 11 13 11 14	11 1 10 56 10 58 11 1	10 40 10 40 10 44 10 50	12 20 12 37 12 43 12 43	12 7 12 23 12 29 12 31	11 56 12 10 12 15 12 18	11 43 11 55 12 2 12 4	225 187 159 136	202 172 145 125	163 144 125 109	115 110 102 88
6	B.A.C. 1238 10	30 35 40 45	12 3 11 59 11 59 12 2	11 51 11 46 11 43 11 44	11 41 11 32 11 27 11 25	11 31 11 20 11 12 11 7	13 17 13 18 13 14 13 7	13 3 13 4 13 2 12 55	12 47 12 49 12 48 12 43	12 30 12 33 12 33 12 28	182 158 130 106	178 150 125 97	163 133 110 86	124 105 86 65
6	α Tauri 1	30 35 40 45	12 58 12 50 12 47 12 47	12 42 12 36 12 34 12 35	12 23 12 19 12 20 12 23	12 3 12 3 12 6 12 12	14 2 14 3 14 0 13 54	13 48 13 52 13 50 13 45	13 34 13 39 13 38 13 34	13 18 13 24 13 24 13 23	194 167 143 120	195 168 141 116	189 161 134 110	171 145 124 101
6	Rumk. 1241	30 35 40 45	15 11 14 58 14 49 14 43	15 8 14 52 14 42 14 36	15 5 14 44 14 33 14 27	15 1 14 33 14 22 14 16	15 50 15 52 15 50 15 45	15 39 15 46 15 45 15 41	15 24 15 37 15 38 15 35	15 1 15 26 15 29 15 27	208 182 159 140	221 189 165 144	234 194 168 146	15'' s. 197 171 148
6	Rumk. 1247	30 35 40 45	15 45 15 40 15 37 15 35	15 41 15 35 15 31 15 29	15 34 15 27 15 23 15 21	15 26 15 18 15 14 15 13	16 43 16 39 16 32 16 22	16 40 16 37 16 31 16 21	16 35 16 33 16 27 16 19	16 27 16 22 16 22 16 14	164 145 126 103	173 152 132 109	181 159 137 115	189 164 141 119
6	Rumk. 1254	30 35 40 45	16 2 15 57 15 53 15 49	15 59 15 53 15 47 15 44	15 55 15 47 15 41 15 37	15 48 15 39 15 33 15 29	16 57 16 54 16 48 16 40	16 54 16 52 16 47 16 39	16 50 16 49 16 44 16 38	16 43 16 43 16 40 16 33	170 151 132 113	179 159 138 116	188 165 144 123	196 171 149 127
11	B.A.C. 3345 6	30 35 40 45	..... ..... 10 34 10 18	..... ..... 10 22 10 15	..... ..... 10 17 10 13	10 27 10 15 10 15 10 13	..... ..... 10 34 10 56	..... ..... 10 38 10 55	..... ..... 10 43 10 56	..... ..... 10 47 10 57	Star 15'' s.	..... ..... 134 113	..... ..... 121 106	Star 45'' s. 114 101

\* Below the horizon.

# OCCULTATIONS, 1868.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date.	Star's Name and Magnitude.	Latitude.	IMMERSON.				EMERSON.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3
1868.			h m	h m	h m	h m	h m	h m	h m	h m	Star o	o	o	o
Jan. 15	$\beta$ Virginis 6	30	...	...	...	...	...	...	...	...	Star 1'30"	s.	...	...
		35	14 36	...	...	...	14 36	...	...	...	75	80	86	92
		40	14 20	14 21	*14 22	...	14 59	14 52	14 47	*14 44	59	62	65	68
		45	14 16	14 15	*14 16	...	15 10	15 5	15 1	*15 0	...	...	...	...
28	$\delta$ Piscium 6½	30	10 6	10 2	9 54	9 45	*10 48	10 49	10 48	10 46	216	211	207	202
		35	9 57	9 53	9 47	9 40	*10 52	10 52	10 51	10 49	188	187	184	177
		40	9 52	9 49	9 44	9 37	*10 52	10 52	10 50	10 47	166	165	161	154
		45	9 48	9 46	9 42	9 37	*10 47	10 47	10 45	10 42	143	141	138	133
Feb. 12	$\eta$ Virginis 6	30	15 41	...	...	...	15 41	...	...	...	Star 1'45"	s.	...	...
		35	15 17	15 27	...	...	15 58	15 27	...	...	91	Star 0"	s.	...
		40	15 7	15 4	15 4	15 10	16 7	15 52	15 37	15 17	76	82	88	108
		45	15 3	14 58	14 56	14 55	16 13	16 1	15 50	15 41	65	67	71	75
Mar. 4	$\epsilon$ Cancri 6	30	16 37	16 40	16 42	16 44	*17 23	17 24	17 23	17 19	159	167	179	191
		35	16 30	16 31	16 31	16 31	17 19	17 21	17 21	17 18	143	152	160	169
		40	16 22	16 22	16 22	16 20	17 14	17 16	17 16	17 14	129	136	142	150
		45	16 16	16 15	16 13	16 10	17 7	17 9	17 9	17 8	115	121	128	134
6	$\delta$ Leonis 6	30	7 54	7 46	7 41	7 37	8 31	8 25	8 21	8 20	72	68	65	60
		35	7 47	7 42	7 38	7 36	8 44	8 36	8 31	8 28	55	52	49	45
		40	7 47	7 43	7 40	7 38	8 51	8 43	8 38	8 34	42	39	36	32
		45	7 50	7 47	7 44	7 43	8 55	8 48	8 42	8 38	31	28	25	21
7	$\epsilon$ Leonis 5	30	17 17	17 16	17 21	17 22	18 0	17 52	17 35	17 22	174	182	190	2' s.
		35	17 4	17 1	16 57	16 58	17 57	17 51	17 41	17 24	153	160	168	178
		40	16 54	16 49	16 46	16 39	17 51	17 46	17 38	17 27	138	142	148	152
		45	16 44	16 38	16 32	16 25	17 44	17 40	17 33	17 23	123	128	131	134
9	$\kappa$ Virginis 6	30	20 12	20 9	20 4	19 59	20 57	20 55	20 52	20 45	170	169	169	170
		35	20 2	19 57	19 52	19 46	20 53	20 52	20 48	20 42	152	151	151	152
		40	19 51	19 47	19 42	19 34	20 48	20 46	20 43	20 37	135	136	135	134
		45	19 42	19 38	19 32	19 25	20 40	20 38	20 35	20 30	120	120	121	120
12	$\gamma$ Libræ 4½	30	19 37	19 21	19 4	18 48	20 58	20 46	20 31	20 13	135	128	122	114
		35	19 30	19 14	18 58	18 42	20 51	20 40	20 26	20 10	118	113	106	100
		40	19 25	19 10	18 54	18 39	20 43	20 32	20 19	20 5	104	97	92	87
		45	19 20	19 6	18 52	18 38	20 33	20 24	20 12	20 0	89	84	80	76
28	$\alpha$ Tauri 1	30	11 15	11 13	11 9	11 3	12 9	12 11	12 11	12 8	138	147	157	163
		35	11 14	11 10	11 6	10 59	12 2	12 4	12 5	12 3	121	126	135	142
		40	11 14	11 10	11 4	10 57	11 52	12 55	11 56	11 55	98	106	114	120
		45	11 21	11 13	11 6	10 58	11 34	11 41	11 44	11 43	63	80	91	97
Apr. 7	$\eta$ Virginis 6	30	11 8	11 7	...	...	11 23	11 7	...	...	98	Star 2'15"	s.	Star
		35	10 50	10 50	10 53	10 59	11 41	11 25	11 10	10 59	72	80	93	1' s.
		40	10 45	10 42	10 41	10 41	11 48	11 37	11 27	11 20	60	63	68	74
		45	10 45	10 41	10 39	10 38	11 52	11 44	11 36	11 31	48	52	54	58
May 3	$\kappa$ Virginis 6	30	15 9	15 7	15 9	...	15 43	15 23	15 9	...	162	186	1' s.	Star
		35	14 52	14 46	14 42	14 49	15 42	15 33	15 18	14 49	161	163	168	15' s.
		40	14 39	14 33	14 25	14 20	15 38	15 30	15 18	15 3	144	145	147	150
		45	14 28	14 21	14 13	14 6	15 31	15 25	15 15	15 2	129	131	131	133
10	B.A.C. 3536 6	30	14 8	13 54	13 44	13 38	15 7	14 57	14 49	14 43	8	8	10	14
		35	14 29	14 8	13 55	13 47	14 54	14 51	14 47	14 43	343	352	358	3
		40	...	14 36	14 15	14 1	...	14 36	14 39	14 40	...	Star	338	347
		45	...	...	...	14 28	...	...	...	14 28	...	45' n.	...	Star 30' n.
16	$\delta$ Piscium 5½	30	16 38	16 35	*16 35	...	17 46	17 40	17 35	17 33	62	57	53	52
		35	16 46	16 43	*16 42	...	17 54	17 47	17 43	17 41	56	50	47	46
		40	16 56	16 53	*16 51	...	18 1	17 55	17 50	17 47	52	46	42	40
		45	17 7	17 4	17 2	*17 2	18 8	18 1	17 57	17 54	48	42	39	37

\* Below the horizon.

# OCCULTATIONS, 1868.

OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.														
Date. 1868.	Star's Name and Magnitude.	Latitude.	IMMERSION.				EMERSON.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h 1 30	m 2	h 2 30	m 3	h 1 30	m 2	h 2 30	m 3	h 1 30	m 2	h 2 30	m 3
May 18	γ Piscium 4½	30°	17 55	17 54	17 54	.....	18 57	18 53	18 51	18 50	59°	53°	46°	46°
		35	18 3	18 2	18 2	*18 4	19 5	19 0	18 57	18 56	54	48	42	39
		40	18 12	18 11	18 12	*18 13	19 13	19 7	19 4	19 2	50	42	37	34
		45	18 23	18 22	18 22	18 23	19 21	19 14	19 10	19 8	48	38	33	30
25	3 Cancri 6	30	10 27	10 23	10 18	10 12	11 15	11 17	11 17	11 15	111	123	130	140
		35	10 24	10 19	10 13	10 5	11 5	11 8	11 8	11 7	92	103	112	121
		40	10 24	10 17	10 9	10 1	10 52	10 56	10 58	10 57	70	83	94	102
		45	10 31	10 17	10 6	9 57	10 31	10 41	10 45	10 45	Star	59	74	83
31	β Virginis 5	30	10 24	.....	.....	.....	10 24	.....	.....	.....	Star 30'' N.	.....	.....	.....
		35	10 10	10 4	.....	.....	10 19	10 4	.....	.....	147	Star 3' N.	.....	.....
		40	9 45	9 46	9 47	.....	10 36	10 9	9 47	.....	119	126	Star 2' N.	.....
		45	9 34	9 28	9 27	9 35	10 38	10 20	9 59	9 35	105	104	111	Star 45'' N.
June 27	66 Virginis 6	30	13 51	13 48	13 44	13 36	*14 41	14 41	14 39	14 36	103	101	100	99
		35	13 48	13 45	13 40	13 32	*14 30	14 29	14 27	14 23	84	82	81	79
		40	13 46	13 44	13 39	13 30	14 16	14 14	14 12	14 8	63	63	59	59
		45	.....	13 50	13 44	13 31	.....	13 50	13 49	13 49	.....	Star	33	27
July 1	24 Scorpii 5	30	7 59	7 54	7 51	7 52	9 19	9 5	8 53	8 41	47	49	54	61
		35	8 1	7 54	7 50	7 49	9 19	9 8	8 58	8 50	36	39	43	48
		40	8 6	7 58	7 53	*7 51	9 18	9 10	9 52	8 56	26	30	33	38
		45	8 13	8 4	7 59	*7 55	9 17	9 11	9 5	9 0	18	22	25	29
7	μ Capricor. 5	30	13 24	13 12	13 5	13 1	14 15	14 2	13 49	13 38	131	119	112	109
		35	13 23	13 12	13 4	13 0	14 31	14 17	14 5	13 55	122	110	102	98
		40	13 26	13 16	13 8	13 3	14 42	14 29	14 17	14 7	116	104	96	91
		45	13 32	13 22	13 14	13 9	14 50	14 38	14 27	14 18	111	100	91	87
8	64 Aquarii 6½	30	12 55	12 48	12 42	*12 39	14 5	13 52	13 43	13 37	34	26	21	20
		35	13 8	13 2	12 56	*12 51	14 6	13 53	13 45	13 39	25	16	12	10
		40	13 28	13 21	13 14	13 7	14 3	13 51	13 43	13 39	10	2	357	355
		45	13 51	.....	.....	.....	13 51	.....	.....	.....	Star	30'' N.	.....	.....
15	B.A.C. 1391 5	30	16 23	16 26	*16 30	.....	17 14	17 11	17 9	17 8	20	12	5	0
		35	16 34	16 37	16 42	*16 49	17 17	17 13	17 9	17 6	10	2	352	341
		40	16 46	16 51	17 1	.....	17 19	17 11	17 1	.....	0	345	Star 15'' N.	.....
		45	17 4	17 9	.....	.....	17 14	17 9	.....	.....	338	Star 1'30'' N.	.....	.....
15	Rumk. 1235	30	17 22	17 16	17 14	17 14	17 57	17 59	18 0	18 1	100	87	78	71
		35	17 23	17 19	17 18	17 18	18 12	18 11	18 10	18 10	87	78	70	64
		40	17 27	17 24	17 23	17 24	18 23	18 21	18 19	18 18	80	72	64	58
		45	17 34	17 31	17 31	17 31	18 33	18 30	18 27	18 25	74	66	59	53
24	48 Virginis 6	30	11 5	11 9	.....	.....	11 19	11 9	.....	.....	205	Star 10'' S.	.....	.....
		35	10 44	10 41	10 38	10 33	11 23	11 19	11 11	10 56	175	175	178	185
		40	10 31	10 27	10 22	10 17	11 20	11 16	11 10	11 1	156	156	157	161
		45	10 20	10 15	10 9	10 4	11 14	11 11	11 5	10 57	140	140	141	142
Aug. 3	42 Capricor. 6	30	14 53	14 32	14 12	13 55	16 19	16 7	15 51	15 32	128	133	138	138
		35	14 53	14 35	14 19	14 3	16 22	16 9	15 52	15 33	116	119	122	123
		40	14 55	14 41	14 26	14 13	16 22	16 8	15 51	15 33	103	106	107	106
		45	14 57	14 46	14 34	14 23	16 18	16 4	15 48	15 29	89	92	92	90
4	58 Aquarii 6	30	.....	.....	17 1	16 37	.....	.....	17 11	16 46	Star	2'	.....	208
		35	.....	17 18	16 51	16 17	.....	17 18	17 12	17 15	1'	30' s	214	181
		40	17 28	17 3	16 36	16 13	17 28	17 32	17 33	17 26	15'' s	213	187	165
		45	17 7	16 48	16 30	16 13	17 47	17 45	17 40	17 32	205	187	169	156
20	γ Virgi., pr. 2½	30	9 31	9 28	9 24	9 18	*10 25	10 25	10 24	10 21	132	131	133	134
		35	9 23	9 20	9 16	9 9	*10 18	10 18	10 16	10 13	114	114	116	117
		40	9 17	9 14	9 9	9 2	*10 10	10 10	10 7	10 4	102	101	102	102
		45	9 11	9 7	9 2	8 55	10 0	19 59	9 57	9 55	86	87	87	88

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# OCCULTATIONS, 1868.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date. 1868.	Star's Name and Magnitude.	Latitude.	IMMERSION.				EMERSON.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3
Aug. 20	B.A.C. 4277 6	30°	*10 19	10 19	10 18	10 14	.....	.....	*11 14	11 13	.....	.....	126°	125°
		35	*10 14	10 13	10 11	10 7	.....	.....	*11 5	11 4	.....	.....	109	108
		40	*10 8	10 7	10 5	10 1	.....	.....	*10 56	10 56	10 55	.....	93	93
		45	10 3	10 2	10 0	9 55	.....	*10 46	10 45	10 44	.....	.....	78	78
Sept. 3	14 Ceti 6½	30	15 11	14 46	14 26	14 10	16 13	16 4	15 52	15 38	198	167	136	106
		35	15 7	14 48	14 32	14 19	16 25	16 14	16 1	15 45	176	152	128	98
		40	15 8	14 53	14 40	14 29	16 32	16 20	16 6	15 50	159	138	115	91
		45	15 12	14 59	14 48	14 39	16 35	16 23	16 9	15 54	141	122	103	83
3	15 Ceti 6	30	.....	.....	16 10	15 34	.....	.....	16 10	16 13	.....	1' 2' s.	179	
		35	.....	16 32	15 55	15 29	.....	16 32	16 39	16 35	.....	15' s.	194	165
		40	16 44	16 12	15 49	15 30	16 53	16 59	16 55	16 46	232	200	175	151
		45	16 24	16 6	15 48	15 33	17 18	17 12	17 4	16 55	195	178	158	140
27	μ Capricor. 5	30	8 17	8 3	7 53	7 46	9 35	9 20	9 5	8 52	121	104	93	86
		35	8 20	8 7	7 57	7 51	9 45	9 30	9 16	9 3	114	98	87	80
		40	8 25	8 13	8 4	7 57	9 52	9 38	9 24	9 12	107	93	82	75
		45	8 32	8 21	8 12	8 4	9 58	9 44	9 31	9 21	102	88	78	72
Oct. 3	μ Ceti 4	30	13 42	13 17	13 2	12 52	14 17	14 15	14 8	14 1	153	119	97	80
		35	13 36	13 19	13 7	12 59	14 41	14 31	14 21	14 12	143	114	92	75
		40	13 38	13 25	13 15	13 7	14 53	14 42	14 31	14 20	133	108	88	71
		45	13 43	13 32	13 24	13 17	15 2	14 50	14 39	14 28	123	102	84	67
4	f Tauri 4	30	10 23	10 21	*10 21	.....	11 2	11 3	11 5	11 8	98	90	84	79
		35	10 26	10 24	10 25	*10 27	11 15	11 15	11 15	11 16	89	81	76	72
		40	10 30	10 29	10 30	*10 32	11 26	11 25	11 24	11 25	82	76	71	67
		45	10 37	10 36	10 37	10 39	11 37	11 34	11 33	11 33	79	73	67	63
5	Rumk. 1203	30	12 32	12 30	12 31	12 34	13 39	13 30	13 22	13 15	33	22	11	0
		35	12 43	12 42	12 44	12 49	13 44	13 33	13 23	13 13	26	12	359	343
		40	12 56	12 57	13 3	13 8	13 46	13 33	13 18	13 8	17	0	338	Star
		45	13 13	13 24	.....	.....	13 45	13 24	.....	.....	3	Star	45" n	1'30" n.
5	75 Tauri 6	30	12 39	12 39	12 40	12 44	13 44	13 32	13 23	13 13	23	10	358	343
		35	12 53	12 53	13 0	13 5	13 46	13 32	13 17	13 5	14	358	336	Star
		40	13 9	13 20	.....	.....	13 45	13 20	.....	.....	2	Star	0' n.	1'15" n.
		45	13 20	.....	.....	.....	13 20	.....	.....	.....	Star	1' n.	.....	n.
5	θ Tauri 4½	30	12 57	12 37	12 29	12 26	12 57	13 8	13 11	13 12	Star	30" s.	106	92
		35	12 45	12 36	12 32	12 30	13 25	13 25	13 24	13 23	107	92	82	74
		40	12 47	12 41	12 37	12 35	13 41	13 38	13 35	13 33	97	85	76	67
		45	12 51	12 46	12 43	12 43	13 54	13 49	13 45	13 42	90	80	70	63
5	Rumk. 1210	30	12 47	12 41	12 38	12 37	13 50	13 45	13 40	13 36	75	64	54	45
		35	12 52	12 47	12 45	12 45	14 2	13 54	13 48	13 43	69	57	47	38
		40	13 0	12 56	12 54	12 54	14 11	14 2	13 55	13 49	64	52	42	32
		45	13 9	13 5	13 4	13 4	14 17	14 8	14 1	13 54	59	46	36	26
5	B.A.C. 1391 5	30	13 47	13 32	13 24	13 19	14 32	14 20	14 25	14 21	105	88	74	63
		35	13 46	13 36	13 29	13 26	14 50	14 43	14 36	14 30	95	79	66	56
		40	13 50	13 42	13 37	13 34	15 2	14 53	14 45	14 38	89	73	61	50
		45	13 57	13 50	13 46	13 43	15 12	15 2	14 53	14 45	84	69	57	46
5	α Tauri 1	30	.....	17 36	16 56	16 28	.....	17 36	17 33	17 25	.....	30" s.	152	114
		35	17 29	17 7	16 45	16 27	18 21	18 7	17 54	17 41	201	176	143	110
		40	17 19	17 1	16 45	16 31	18 32	18 18	18 4	17 50	171	152	128	102
		45	17 16	17 2	16 48	16 37	18 36	18 23	18 10	17 56	146	131	115	92
6	115 Tauri 5½	30	*14 32	14 15	14 0	13 52	14 32	14 32	14 37	14 38	Star	2' s.	114	94
		35	14 21	14 7	13 59	13 55	14 56	14 55	14 53	14 50	110	92	80	70
		40	14 18	14 9	14 3	14 0	15 15	15 9	15 4	15 0	95	82	71	63
		45	14 21	14 14	14 9	14 7	15 27	15 20	15 13	15 9	87	75	65	58

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# OCCULTATIONS, 1868.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date.	Star's Name and Magnitude.	Latitude.	IMMERSION.				EMERSON.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m	h	h m	h	h m	h	h m	h	h m	h	h m	h
1868.			1 30	2	2 30	3	1 30	2	2 30	3	1 30	2	2 30	3
Oct. 6	120 Tauri 6	30	18 7	17 47	17 29	17 15	19 36	19 19	18 59	18 41	163	152	113	61°
		35	18 7	17 51	17 36	17 24	19 33	19 17	18 59	18 41	133	120	90	53
		40	18 13	17 58	17 44	17 36	19 25	19 10	18 53	18 36	104	90	64	36
		45	18 24	18 12	18 2	17 56	19 12	18 58	18 42	18 23	71	57	35	10
8	B.A.C. 2432 6½	30	.....	14 18	14 14	*14 7	.....	14 18	14 23	14 33	Star	2' s.	112	93
		35	14 21	14 9	14 5	*14 4	14 27	14 38	14 42	14 45	121	95	84	76
		40	14 12	14 7	14 6	14 6	14 51	14 52	14 53	14 54	88	80	72	66
		45	14 13	14 10	14 9	14 10	15 5	15 3	15 2	15 3	76	69	64	58
24	42 Capricor. 6	30	11 53	11 43	11 31	11 19	13 7	13 1	12 52	12 37	170	156	142	121
		35	11 52	11 45	11 37	11 30	13 4	12 57	12 45	12 28	148	135	117	96
		40	11 54	11 49	11 46	11 51	12 58	12 48	12 33	12 5	126	111	91	56
		45	11 58	11 58	12 8	.....	12 47	12 34	12 8	.....	102	84	Star	30'' s.
25	σ Aquarii 4	30	13 14	13 5	12 55	12 44	14 23	14 20	14 14	14 4	180	170	158	145
		35	13 13	13 6	12 59	12 52	14 22	14 17	14 10	13 58	158	146	136	120
		40	13 13	13 9	13 5	13 3	14 16	14 11	14 1	13 45	135	126	112	91
		45	13 16	13 15	13 17	13 22	14 6	13 58	13 44	13 22	110	98	79	Star
25	58 Aquarii 6	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Star
		35	.....	.....	.....	13 38	.....	.....	.....	13 38	.....	.....	.....	Star
		40	.....	13 54	13 43	13 15	.....	13 54	13 50	13 59	2' 15'' s.	238	207	1' 5'' s.
		45	13 49	13 34	13 19	13 4	14 1	14 8	14 9	14 7	235	213	198	183
29	ν Piscium 4½	30	15 29	15 14	14 57	14 40	16 34	16 27	16 18	16 6	202	197	188	174
		35	15 24	15 12	14 58	14 44	16 37	16 30	16 21	16 8	176	171	164	150
		40	15 22	15 12	15 1	14 50	16 35	16 28	16 18	16 6	154	148	139	128
		45	15 23	15 15	15 7	14 59	16 29	16 22	16 12	15 59	130	125	116	103
Nov. 3	71 Orionis 5½	30	17 1	16 39	16 18	15 59	18 2	17 43	17 25	17 9	193	173	119	82
		35	16 50	16 31	16 14	15 59	18 9	17 52	17 35	17 19	161	147	112	80
		40	16 46	16 31	16 16	16 3	18 9	17 54	17 39	17 24	135	121	97	72
		45	16 46	16 34	16 21	16 10	18 4	17 51	17 38	17 25	105	92	76	60
5	ζ¹ Cancri 4½	30	15 55	15 42	15 31	15 23	17 2	16 47	16 35	16 27	66	58	51	45
		35	15 52	15 41	15 32	15 26	17 10	16 55	16 43	16 33	58	48	40	33
		40	15 54	15 45	15 37	15 32	17 12	16 59	16 47	16 37	49	39	30	24
		45	16 0	15 52	15 45	15 41	17 12	17 0	16 49	16 39	38	29	21	13
6	π¹ Cancri 6½	30	17 16	17 3	16 49	16 37	17 51	17 33	17 22	17 15	90	86	81	75
		35	17 1	16 49	16 40	16 31	18 6	17 51	17 38	17 29	74	67	62	58
		40	16 57	16 47	16 38	16 31	18 13	17 58	17 47	17 37	65	56	50	45
		45	16 58	16 49	16 41	16 36	18 14	18 2	17 51	17 42	52	47	40	34
6	π² Cancri 6	30	18 41	18 26	18 12	17 58	20 3	19 43	19 23	19 5	120	86	63	55
		35	18 36	18 20	18 7	17 55	20 10	19 43	19 27	19 11	92	71	56	45
		40	18 34	18 20	18 8	17 57	19 54	19 40	19 26	19 13	71	56	44	35
		45	18 38	18 24	18 13	18 3	19 45	19 34	19 23	19 11	48	40	31	24
8	χ Leonis 5	30	17 17	17 11	17 5	16 59	17 36	17 26	17 22	17 21	87	89	87	83
		35	17 2	16 57	16 53	16 50	17 55	17 46	17 40	17 37	59	58	58	55
		40	16 59	16 54	16 51	16 49	18 3	17 55	17 49	17 45	45	45	44	42
		45	17 1	16 56	16 54	16 52	18 7	18 0	17 54	17 50	34	33	32	30
24	14 Ceti 6½	30	15 3	14 58	14 51	14 40	*15 40	15 40	15 39	15 37	223	221	217	211
		35	14 52	14 48	14 42	14 33	*15 46	15 46	15 44	15 42	194	193	190	185
		40	14 46	14 43	14 37	14 30	*15 46	15 46	15 44	15 41	170	169	167	163
		45	14 42	14 39	14 35	14 29	*15 43	15 42	15 40	15 37	148	147	145	141
25	35 Ceti 6½	30	7 16	7 6	6 59	6 54	8 32	8 21	8 11	8 2	106	86	71	63
		35	7 23	7 14	7 7	7 3	8 43	8 31	8 20	8 11	102	82	67	56
		40	7 31	7 23	7 17	7 13	8 51	8 39	8 27	8 18	97	78	63	52
		45	7 40	7 33	7 27	7 24	8 58	8 46	8 35	8 25	92	75	61	48

\* Below the horizon.

# OCCULTATIONS, 1868.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date. 1868.	Star's Name and Magnitude.	Latitude. C	IMMERSION.				EMERSION.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m 1 30	h m 2	h m 2 30	h m 3	h m 1 30	h m 2	h m 2 30	h m 3	h m 1 30	h m 2	h m 2 30	h m 3
Dec. 2	g Geminor. 5½	30	10 43	10 41	10 42	*10 44	11 36	11 35	11 34	11 35	54	47	40	33
		35	10 46	10 45	10 46	*10 49	11 45	11 42	11 40	11 39	43	36	30	24
		40	10 51	10 51	10 52	10 55	11 51	11 46	11 44	11 42	33	27	21	14
		45	10 59	10 59	11 1	11 4	11 55	11 50	11 47	11 44	23	17	11	3
4	v Leonis 5	30	18 48	18 42	18 42	...	19 44	19 17	18 42	...	159	152	Star	1' s.
		35	18 33	18 22	18 12	18 2	19 44	19 26	19 4	18 41	132	125	110	100
		40	18 24	18 11	17 59	17 48	19 41	19 26	19 10	18 53	109	103	93	84
		45	18 19	18 6	17 55	17 44	19 35	19 23	19 10	18 56	89	85	78	70
8	80 Virginis 6	30	18 41	18 32	18 26	18 23	19 56	19 45	19 35	19 26	16	18	22	26
		35	18 43	18 34	18 27	18 23	19 50	19 42	19 34	19 28	3	6	10	14
		40	18 50	18 39	18 32	18 27	19 42	19 37	19 32	19 27	348	353	357	3
		45	19 7	18 51	18 42	18 35	19 27	19 29	19 27	19 24	321	335	343	347
26	48 Tauri 6	30	...	...	7 30	7 18	...	...	7 30	7 39	...	Star	1' s.	114
		35	...	7 41	7 21	7 16	...	7 41	7 54	7 56	...	0' s.	109	97
		40	7 43	7 30	7 23	7 19	8 5	8 9	8 9	8 8	131	112	99	88
		45	7 41	7 33	7 27	7 24	8 26	8 24	8 21	8 19	117	103	92	84
26	Rumk. 1203	30	15 51	...	...	...	15 51	...	...	...	Star	2' 15" s.	Star	5' s.
		35	15 26	15 22	15 19	15 1	15 58	15 46	15 27	15 1	215	226	241	5' s.
		40	15 10	15 3	14 51	14 40	16 4	15 56	15 47	15 36	185	191	193	193
		45	15 0	14 52	14 42	14 30	16 3	15 57	15 50	15 40	163	166	169	166
26	75 Tauri 6	30	15 42	15 44	...	...	16 1	15 44	...	...	233	Star	45' s.	...
		35	15 21	15 14	15 5	14 51	16 11	16 3	15 52	15 40	197	203	208	210
		40	15 10	15 2	14 52	14 39	16 12	16 5	15 57	15 46	173	177	180	183
		45	15 2	14 54	14 45	14 33	16 8	16 3	15 56	15 47	151	155	156	155
26	Rumk. 1232	30	17 14	17 14	17 12	17 9	18 6	18 5	18 3	17 57	172	184	192	202
		35	17 8	17 6	17 3	16 58	18 4	18 4	18 2	17 58	154	162	169	177
		40	17 3	17 1	16 57	16 51	17 58	17 59	17 58	17 55	135	142	149	156
		45	17 0	16 57	16 52	16 46	17 51	17 52	17 52	17 50	116	124	130	136
27	119 Tauri 5½	30	17 53	17 52	17 50	17 46	18 47	18 47	18 44	18 38	161	172	182	192
		35	17 47	17 45	17 41	17 35	18 43	18 43	18 42	18 37	142	151	161	167
		40	17 43	17 39	17 35	17 28	18 37	18 37	18 36	18 33	125	133	141	148
		45	17 40	17 35	17 30	17 23	18 28	18 29	18 29	18 26	109	114	122	128
27	120 Tauri 6	30	18 25	18 27	18 28	18 29	...	*19 16	19 16	19 14	...	168	180	192
		35	18 20	18 20	18 20	18 19	*19 10	19 13	19 14	19 13	140	149	159	168
		40	18 15	18 15	18 13	18 11	*19 6	19 8	19 10	19 9	125	133	141	150
		45	18 12	18 10	18 8	18 4	18 58	19 1	19 3	19 3	107	116	123	132
28	71 Orionis 5½	30	8 1	7 58	7 57	7 58	8 53	8 51	8 50	8 50	67	58	49	43
		35	8 4	8 2	8 2	8 4	9 3	9 0	8 57	8 56	57	48	41	34
		40	8 10	8 8	8 9	8 11	9 11	9 6	9 3	9 1	49	40	34	27
		45	8 17	8 16	8 17	8 19	9 17	9 12	9 7	9 4	41	34	25	18
31	7 Leonis 6½	30	15 57	15 40	15 24	15 10	17 14	17 1	16 46	16 39	88	73	45	27
		35	16 1	15 42	15 26	15 13	17 1	16 51	16 39	16 25	54	45	31	16
		40	16 10	15 50	15 33	15 21	16 42	16 37	16 28	16 17	16	15	8	0
		45	...	...	16 3	15 39	...	...	16 3	16 1	...	...	Star	331

\* Below the horizon.

# OCCULTATIONS, 1869.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date.	Star's Name and Magnitude.	Latitude.	IMMERSION.					EMERSION.					ANGLE FROM VERTEX.				
			Longitude					Longitude					Longitude				
			h m	h	h m	h	h m	h m	h	h m	h	h m	h m	h	h m	h	h m
1869.			1 30	2	2 30	3	1 30	2	2 30	3	1 30	2	2 30	3	1 30	2	2 30
Jan. 22	Weis. III., 1085. 8½	30	15 18	15 27	15 31	...	15 45	15 37	15 31	...	217	237	Star	1' s.			
		35	15 4	15 5	15 5	15 4	15 50	15 48	15 43	15 36	189	197	208	218			
		40	14 55	14 54	14 52	14 48	15 49	15 48	15 46	15 42	166	174	180	186			
		45	14 48	14 46	14 43	14 37	15 45	15 45	15 44	15 41	147	154	160	164			
23	Rumk. 1300	30	10 45	10 28	10 14	10 1	12 6	11 50	11 30	11 9	140	132	103	48			
		35	10 54	10 40	10 29	10 23	11 57	11 41	11 21	10 57	109	107	66	19			
		40	11 17	11 10	...	...	11 34	11 10	...	...	62	Star	15" n.				
		45	11 26	...	...	...	11 26	...	...	...	Star	4" n.					
26	♄ Cancri 4½	30	19 11	19 13	19 14	19 15	*19 58	20 0	19 59	19 56	151	160	171	183			
		35	19 4	19 5	19 4	19 3	19 54	19 56	19 56	19 54	135	145	153	162			
		40	18 58	18 57	18 56	18 54	19 48	19 50	19 50	19 49	120	128	136	144			
		45	18 52	18 51	18 48	18 45	19 41	19 43	19 43	19 43	107	115	121	129			
26	♄ Cancri 7½	30	19 12	19 14	19 16	19 17	*19 59	20 1	20 0	19 57	152	161	172	184			
		35	19 5	19 6	19 6	19 5	19 55	19 57	19 57	19 55	137	146	154	163			
		40	18 59	18 58	18 57	18 55	19 49	19 51	19 51	19 50	121	129	137	144			
		45	18 53	18 52	18 49	18 46	19 42	19 44	19 44	19 44	108	116	122	130			
27	π Cancri 6	30	19 36	19 36	19 37	19 38	20 23	20 22	20 19	20 13	154	164	178	189			
		35	19 27	19 27	19 26	19 24	20 18	20 18	20 16	20 12	141	149	157	166			
		40	19 19	19 18	19 15	19 12	20 12	20 12	20 11	20 8	125	133	139	148			
		45	19 12	19 10	19 6	19 2	20 5	20 5	20 4	20 1	113	118	125	131			
28	α Leonis 1½	30	15 39	15 36	15 34	...	16 30	16 2	15 34	...	162	161	Star	1'30" s.			
		35	15 24	15 14	15 6	15 1	16 31	16 12	15 51	15 26	136	131	121	112			
		40	15 15	15 3	14 53	14 43	16 27	16 13	15 57	15 40	113	110	101	93			
		45	15 9	14 58	14 47	14 37	16 22	16 10	15 57	15 44	95	91	86	78			
30	♁ Virginis 6	30	11 56	11 53	11 51	*11 52	12 53	12 48	12 44	12 41	344	346	346	345			
		35	12 5	12 1	12 0	12 0	12 46	12 42	12 39	12 36	326	328	329	327			
		40	12 29	...	...	...	12 29	...	...	...	Star	45" n.					
		45	...	...	...	...	...	...	...	...	...	...					
Feb. 2	♄ Libræ 6	30	19 16	19 5	18 57	19 0	20 38	20 18	19 54	19 23	110	105	103	107			
		35	19 9	18 56	18 47	18 42	20 33	20 17	19 58	19 37	95	90	88	89			
		40	19 6	18 52	18 42	18 35	20 28	20 14	19 59	19 43	81	78	77	77			
		45	19 3	18 51	18 40	18 32	20 22	20 11	19 58	19 45	69	68	67	67			
4	♏ Scorpii 5	30	19 9	18 52	18 39	18 31	20 17	20 6	19 55	19 45	17	18	20	24			
		35	19 22	19 1	18 45	18 36	20 4	19 58	19 51	19 43	356	2	8	12			
		40	19 42	19 15	18 56	18 44	19 42	19 46	19 45	19 41	Star	341	354	2			
		45	...	19 33	19 16	18 56	...	19 33	19 30	19 35	1" n.	Star	325	344			
6	♐ Sagittarii 5	30	18 12	...	...	...	18 12	...	...	...	Star	3'30" s.					
		35	18 5	18 9	...	...	18 22	18 9	...	...	107	Star	1'30" s.				
		40	17 56	*17 59	...	...	18 42	18 31	*18 18	...	86	94	111	...			
		45	*17 55	...	...	...	18 53	18 45	*18 38	...	76	80	87	...			
15	♄ Ceti 6	30	7 59	7 48	7 37	7 26	9 14	9 7	8 56	8 41	163	158	148	184			
		35	8 3	7 55	7 47	7 41	9 9	9 1	8 48	8 32	139	132	121	104			
		40	8 11	8 7	8 6	8 6	8 58	8 48	8 30	8 6	111	102	82	Star			
		45	8 31	...	...	...	8 31	...	...	...	Star	1" n.	1'30" n.				
17	μ Ceti 5	30	8 34	8 14	7 52	7 31	9 41	9 30	9 18	9 3	207	202	190	171			
		35	8 27	8 11	7 53	7 37	9 46	9 36	9 23	9 8	181	175	164	148			
		40	8 25	8 12	7 58	7 44	9 45	9 36	9 23	9 8	156	151	140	124			
		45	8 26	8 16	8 5	7 55	9 40	9 31	9 19	9 4	132	127	117	102			
19	Rumk. 1203	30	10 3	9 38	9 4	8 34	10 3	9 52	9 44	9 33	Star	10" s.	238	212	174		
		35	9 32	9 12	8 51	8 30	10 32	10 18	10 4	9 49	201	195	181	165			
		40	9 22	9 5	8 48	8 31	10 37	10 25	10 11	9 57	171	168	156	136			
		45	9 18	9 4	8 49	8 36	10 37	10 26	10 13	10 0	149	143	132	117			

\* Below the horizon.



# OCCULTATIONS, 1869.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date.	Star's Name and Magnitude.	Latitude.	IMMERSON.				EMERSON.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3
Feb. 19	15 Tauri 6	30°	9 45	9 24	8 59	8 33	10 34	10 19	10 4	9 49	219	214	200	170°
		35	9 31	9 12	8 53	8 33	10 43	10 30	10 15	10 0	187	184	172	150
		40	9 25	9 9	8 53	8 37	10 45	10 33	10 19	10 4	162	156	146	126
		45	9 23	9 10	8 56	8 44	10 42	10 31	10 18	10 5	137	133	122	108
19	Rumk. 1210	30	.....	.....	.....	9 29	.....	.....	.....	9 29	.....	Star	.....	Star
		35	.....	.....	.....	9 29	.....	.....	.....	9 29	.....	Star	.....	3/s.
		40	.....	10 6	9 41	9 13	.....	10 6	9 55	9 50	.....	30''	214	186
		45	9 50	9 36	9 19	9 3	10 43	10 31	10 20	10 8	190	187	177	162
19	Rumk. 1232	30	12 1	11 53	11 43	11 29	13 3	12 58	12 49	12 38	181	188	196	199
		35	11 54	11 46	11 35	11 21	13 1	12 56	12 49	12 40	158	164	169	171
		40	11 50	11 42	11 31	11 18	12 55	12 52	12 46	12 37	137	142	146	148
		45	11 48	11 40	11 30	11 19	12 46	12 43	12 38	12 31	116	120	124	124
19	α Tauri 1	30	14 1	14 11	.....	.....	14 23	14 11	.....	.....	220	Star	30''	s.
		35	13 46	13 47	13 49	13 51	14 29	14 27	14 21	14 10	188	198	210	228
		40	13 36	13 36	13 34	13 31	14 28	14 28	14 25	14 19	167	174	182	192
		45	13 28	13 26	13 23	13 18	14 25	14 25	14 23	14 19	149	156	161	167
19	Rumk. 1241	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	Star	.....	1' s.
		35	.....	.....	15 51	.....	.....	.....	15 51	.....	.....	Star	.....	1' s.
		40	.....	15 26	15 32	15 38	.....	.....	16 1	15 57	.....	199	215	.....
		45	15 12	15 16	15 19	15 22	.....	16 1	16 2	16 2	.....	167	176	185
20	119 Tauri 5½	30	14 8	14 6	14 2	13 56	15 6	15 6	15 3	14 58	151	162	171	181
		35	14 4	14 1	13 55	13 48	15 0	15 1	15 0	14 56	132	142	151	159
		40	14 1	13 56	13 50	13 42	14 53	14 54	14 53	14 50	115	123	131	139
		45	14 0	13 54	13 47	13 39	14 42	14 44	14 43	14 41	94	104	110	116
20	120 Tauri 6	30	14 44	14 44	14 43	14 41	15 36	15 37	15 36	15 32	159	170	180	191
		35	14 38	14 37	14 34	14 31	15 33	15 34	15 33	15 31	142	150	159	168
		40	14 33	14 31	14 28	14 23	15 26	15 28	15 28	15 27	123	132	140	149
		45	14 30	14 27	14 22	14 17	15 18	15 21	15 21	15 20	106	116	122	130
28	80 Virginis 6	30	16 48	16 32	16 18	16 7	18 6	17 53	17 39	17 22	79	77	74	68
		35	16 47	16 30	16 15	16 3	17 55	17 45	17 33	17 19	69	60	58	56
		40	16 47	16 29	16 14	16 2	17 43	17 36	17 26	17 16	41	43	44	44
		45	16 51	16 33	16 17	16 4	17 29	17 25	17 19	17 11	19	26	30	31
Mar. 18	Rumk. 1136 6	30	11 44	11 40	11 34	11 27	12 27	12 30	12 32	12 31	113	123	132	141
		35	11 51	11 44	11 37	11 29	12 13	12 19	12 21	12 22	84	98	108	117
		40	.....	11 57	11 52	11 37	.....	11 57	12 1	12 5	.....	Star	72	86
		45	.....	.....	.....	11 46	.....	.....	.....	11 46	.....	1'	.....	Star
20	χ³ Orionis 5	30	10 34	10 15	9 57	9 38	11 8	11 5	10 57	10 45	93	105	113	115
		35	.....	10 36	10 17	9 57	.....	10 36	10 31	10 24	.....	Star	66	70
		40	.....	.....	.....	10 7	.....	.....	.....	10 7	.....	1' n.	.....	Star
		45	.....	.....	.....	.....	.....	.....	.....	.....	.....	4' n.	.....	Star
22	ζ¹ Cancri 5½	30	15 57	16 3	16 12	16 18	16 31	16 30	16 26	16 18	181	195	210	130''
		35	15 47	15 50	15 54	15 59	16 30	16 31	16 29	16 24	162	170	183	198
		40	15 38	15 40	15 42	15 43	16 26	16 28	16 27	16 25	147	155	164	173
		45	15 30	15 31	15 31	15 31	16 21	16 23	16 23	16 21	133	140	148	156
23	π² Cancri 6	30	17 16	17 20	17 24	17 28	.....	17 58	17 59	17 57	.....	170	180	190
		35	17 8	17 11	17 13	17 16	.....	17 56	17 57	17 57	.....	153	161	168
		40	17 1	17 3	17 4	17 4	17 48	17 51	17 53	17 53	131	138	145	152
		45	16 53	16 55	16 55	16 55	17 43	17 45	17 47	17 47	129	125	131	137
24	α Leonis 1½	30	14 23	14 17	14 10	14 7	15 26	15 18	15 6	14 48	146	154	165	175
		35	14 14	14 6	13 57	13 49	15 19	15 12	15 3	14 49	123	135	142	148
		40	14 7	13 57	13 48	13 39	15 10	15 6	14 57	14 46	110	117	123	125
		45	14 0	13 50	13 40	39 39	15 1	14 56	14 50	14 41	94	109	105	107

\* Below the horizon.

# OCCULTATIONS, 1869.

OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE  
TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date.	Star's Name and Magnitude.	Latitude.	IMMERSION.				EMERSION.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3	h m 1 30	h 2	h m 2 30	h 3
1869.														
Mar. 26	10 Virginis 6	30	16 41	16 35	16 31	16 30	17 36	17 29	17 17	16 57	152°	157°	165°	176°
		35	16 30	16 23	16 17	16 11	17 31	17 24	17 15	17 1	136°	139°	144°	147°
		40	16 20	16 12	16 5	15 58	17 23	17 18	17 9	16 58	120°	124°	126°	130°
		45	16 12	16 5	15 56	15 48	17 15	17 10	17 3	16 53	107°	110°	112°	113°
														Star
29	♄ Libræ 6	30	12 8	12 7	12 11	12 10	13 2	12 49	12 34	12 19	59	66	79 45'' s.	
		35	12 3	12 1	12 0	12 1	13 7	12 57	12 43	12 40	47	52	58	65
		40	12 3	11 59	11 57	11 57	13 10	13 1	12 54	12 49	36	40	45	49
		45	12 6	12 1	11 59	11 58	13 11	13 4	12 59	12 55	27	30	34	38
														Star
30	49 Libræ 5½	30	17 55	17 44	17 37	17 40	18 54	18 36	18 12	17 40	152	146	142	1's.
		35	17 44	17 32	17 21	17 16	18 54	18 39	18 20	17 58	135	130	124	122
		40	17 37	17 25	17 14	17 6	18 51	18 38	18 22	18 5	121	116	112	109
		45	17 32	17 20	17 10	17 1	18 47	18 35	18 22	18 7	110	105	101	99
Apr. 24	83 Virginis 6	30	15 13	14 46	14 22	14 2	15 25	15 27	15 22	15 13	28	45	53	55
		35	.....	14 59	14 27	14 4	.....	14 59	15 6	15 1	.....	Star	27	32
		40	.....	.....	14 41	14 10	.....	.....	14 41	14 46	.....	30'' n.	Star	8
		45	.....	.....	.....	14 24	.....	.....	.....	14 24	.....	45'' n.	Star	1's.
26	γ Libræ 4½	30	18 30	18 22	18 9	17 51	19 6	18 57	18 47	18 36	75	67	61	56
		35	18 40	.....	.....	18 48	18 40	.....	.....	18 48	Star	30''	n.	Star
		40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20'' n.	Star
		45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Star
May 2	θ Capricor. 4	30	17 20	17 5	16 53	16 44	18 44	18 24	18 7	17 55	59	44	33	30
		35	17 32	17 18	17 5	16 55	18 42	18 23	18 8	17 57	51	33	25	21
		40	17 47	17 33	17 20	17 9	18 38	18 20	18 7	17 57	35	20	16	10
		45	18 7	17 57	17 41	17 27	18 28	18 11	17 59	17 54	14	359	354	356
24	49 Libræ 5½	30	13 19	13 3	12 51	12 42	14 44	14 27	14 8	13 49	102	96	89	86
		35	13 16	13 0	12 47	12 37	14 38	14 23	14 7	13 51	86	81	77	75
		40	13 14	12 59	12 46	12 36	14 32	14 19	14 5	13 51	74	70	67	65
		45	13 14	13 0	12 47	12 37	14 25	14 14	14 2	13 51	62	59	57	56
26	B.A.C. 6098 6	30	17 33	17 20	17 4	16 45	18 43	18 31	18 17	17 59	118	104	91	77
		35	17 34	17 22	17 8	16 51	18 34	18 22	18 6	17 48	99	86	71	56
		40	17 35	17 27	17 16	17 1	18 22	18 8	17 52	17 35	78	63	49	34
		45	17 41	17 42	.....	.....	18 6	17 42	.....	.....	52	Star	0'' n.	.....
27	33 Sagittarii 6	30	14 9	14 5	14 4	.....	14 54	14 28	14 4	.....	130	129	115'' s.	
		35	14 1	13 52	13 48	13 58	15 6	14 46	14 26	13 58	116	111	112	8.5'' s.
		40	13 59	13 50	13 44	13 41	15 12	14 56	14 40	14 24	108	102	101	104
		45	14 0	13 51	13 44	13 40	15 17	15 2	14 49	14 36	101	95	93	94
27	♄ Sagittarii 4	30	16 19	16 0	15 41	15 23	17 50	17 33	17 13	16 54	119	103	88	74
		35	16 21	16 3	15 45	15 28	17 46	17 29	17 11	16 53	104	89	75	63
		40	16 23	16 7	15 51	15 35	17 40	17 23	17 6	16 51	90	75	62	53
		45	16 26	16 12	15 57	15 42	17 32	17 17	17 2	16 50	75	63	52	46
29	B.A.C. 7202 6	30	18 32	18 16	18 1	17 46	19 50	19 31	19 5	18 38	116	94	66	37
		35	18 38	18 29	18 21	18 14	19 42	19 20	18 48	18 14	95	70	34	Star
		40	18 50	18 54	.....	.....	19 30	18 54	.....	.....	71	Star	30''	30'' n.
		45	19 8	.....	.....	.....	19 8	.....	.....	.....	Star	1'' n.	n.	.....
June 16	δ Virginis 6	30	10 48	10 35	10 20	10 5	11 44	11 40	11 34	11 25	87	93	100	104
		35	10 46	10 31	10 15	9 59	11 29	11 27	11 22	11 15	65	73	79	84
		40	10 48	10 30	10 12	9 56	11 11	11 12	11 10	11 4	38	52	59	65
		45	10 52	10 34	10 13	9 55	10 52	10 53	10 55	10 52	15'' n.	24	38	47
20	γ Libræ 4½	30	9 47	9 34	9 25	9 20	11 12	10 56	10 39	10 23	62	59	57	60
		35	9 47	9 33	9 23	9 16	11 6	10 53	10 40	10 26	49	48	49	49
		40	9 50	9 35	9 25	9 17	10 59	10 49	10 38	10 23	35	36	37	39
		45	9 55	9 40	9 29	9 20	10 52	10 44	10 36	10 23	23	24	23	30

# OCCULTATIONS, 1869.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date. 1869.	Star's Name and Magnitude.	Latitude.	IMMERSION.				EMERSION.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m 1 30	h m 2	h m 2 30	h m 3	h m 1 30	h m 2	h m 2 30	h m 3	h m 1 30	h m 2	h m 2 30	h m 3
June 20	$\eta$ Libræ 6	30° 35 40 45	15 35 15 23 15 13 15 4	15 26 15 15 15 5 14 57	15 16 15 5 14 55 14 47	15 4 14 53 14 44 14 37	16 19 16 18 16 13 16 7	16 17 16 15 16 10 16 3	16 12 16 9 16 4 15 57	16 4 16 1 15 56 15 50	184° 163 147 131	175° 157 139 125	169° 150 134 120	161° 142 128 115
July 3	$\mu$ Ceti 5	30 35 40 45	17 41 18 1 18 24 .....	17 42 18 7 ..... .....	17 52 ..... ..... .....	..... ..... ..... .....	18 33 18 30 18 24 .....	18 15 18 7 ..... .....	17 52 ..... ..... .....	..... ..... ..... .....	16° 0 Star .....	355 Star 1'45"	Star 1'30"	45" n.
15	$\delta$ Virginis 6	30 35 40 45	11 40 11 31 11 23 11 15	11 34 11 24 11 16 11 8	11 26 11 16 11 7 10 59	11 16 11 4 10 57 10 50	12 40 12 33 12 25 12 16	12 37 12 30 12 22 12 12	12 31 12 24 12 16 12 7	12 23 12 17 12 9 12 1	142° 125 111 98	140° 120 110 97	140° 124 110 96	141° 125 109 97
20	$\mu$ Sagittarii 4	30 35 40 45	13 53 13 48 13 44 13 40	13 36 13 33 13 30 13 28	13 18 13 15 13 15 13 15	12 58 12 57 12 58 13 0	15 9 15 6 15 1 14 55	15 0 14 57 14 51 14 44	14 47 14 44 14 39 14 32	14 31 14 28 14 23 14 19	159° 140 124 111	145° 129 113 99	131° 116 103 88	116° 103 90 79
21	B.A.C. 6539 6	30 35 40 45	13 22 13 27 13 33 13 45	13 3 13 10 13 20 13 41	12 43 12 52 13 5 .....	12 23 12 32 12 46 .....	14 44 14 35 14 24 14 7	14 25 14 16 14 4 13 41	14 4 13 56 13 45 .....	13 44 13 37 13 27 .....	106° 86 66 40	87° 68 48 Star	69° 52 32 20"	54° 38 20 n.
21	$\pi$ Sagittarii 3	30 35 40 45	14 7 14 8 14 9 14 11	13 50 13 52 13 54 14 1	13 31 13 36 13 42 13 50	13 11 13 17 13 25 13 35	15 31 15 26 15 18 15 7	15 17 15 11 15 3 15 51	15 0 14 53 14 45 14 34	14 39 14 34 14 27 14 17	133° 115 99 80	116° 99 83 63	100° 82 65 47	80° 67 51 34
30	$\zeta$ Ceti 4	30 35 40 45	17 41 17 42 17 46 17 52	17 20 17 25 17 33 17 42	17 6 17 14 17 23 17 33	16 57 17 6 17 16 17 27	18 40 18 57 19 9 19 16	18 33 18 46 18 56 19 4	18 23 18 34 18 44 18 51	18 13 18 23 18 31 18 38	152° 145 135 123	119° 112 109 103	93° 90 87 82	75° 72 68 64
Aug. 14	49 Libræ 5½	30 35 40 45	9 14 9 5 8 58 8 53	9 0 8 51 8 44 8 40	8 47 8 38 8 32 8 28	8 40 8 27 8 20 8 17	10 26 10 22 10 17 10 11	10 10 10 8 10 4 10 0	9 50 9 51 9 50 9 47	9 25 9 32 9 33 9 33	145° 127 114 102	137° 122 108 98	132° 116 104 93	129° 112 100 90
17	33 Sagittarii 6	30 35 40 45	14 8 13 47 13 34 13 24	13 48 13 30 13 20 13 12	13 24 13 12 13 5 13 0	13 2 12 54 12 49 12 46	14 8 14 25 14 29 14 28	14 15 14 24 14 26 14 24	14 13 14 19 14 19 14 17	14 6 14 10 14 9 14 7	130° 204 179 161	117° 187 165 150	188° 170 152 138	171° 154 139 127
17	$\zeta$ Sagittarii 4	30 35 40 45	*15 45 *15 36 *15 28 *15 22	15 38 15 31 15 24 15 19	15 30 15 24 15 19 15 15	15 20 15 15 15 12 15 9	..... ..... ..... .....	*16 32 ..... ..... .....	16 32 16 31 16 27 16 26	16 30 16 27 16 21 16 13	..... ..... ..... .....	190° ..... ..... .....	178° ..... ..... .....	166° 158 140 120
21	45 Aquarii 6	30 35 40 45	12 34 12 41 12 48 12 56	12 17 12 26 12 35 12 45	12 2 12 12 12 23 12 35	11 49 12 0 12 12 12 25	14 10 14 13 14 14 14 13	13 51 13 55 13 56 13 55	13 32 13 35 13 37 13 37	13 13 13 17 13 19 13 20	131° 118 106 93	106° 95 84 73	81° 73 65 56	63° 57 48 40
29	Rumk. 1232	30 35 40 45	13 24 13 27 13 33 13 40	13 23 13 27 13 33 13 40	*13 25 *13 29 13 35 13 42	..... ..... *13 38 13 45	14 8 14 20 14 30 14 40	14 11 14 21 14 30 14 38	14 13 14 22 14 30 14 38	14 16 14 24 14 31 14 38	85° 77 71 67	78° 70 64 60	71° 64 59 56	67° 59 55 50
Sept. 2	$\theta$ Cancri 6	30 35 40 45	19 8 18 58 18 58 19 1	18 54 18 50 18 52 18 56	18 46 18 45 18 48 18 53	18 41 18 42 18 46 18 52	19 30 19 50 20 1 20 8	19 29 19 44 19 53 20 0	19 28 19 39 19 47 19 54	19 28 19 37 19 44 19 49	93° 68 56 46	80° 61 49 40	69° 54 43 34	61° 48 38 29

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# OCCULTATIONS, 1869.

## OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.

Date. 1869.	Star's Name and Magnitude.	Latitude.	IMMERSION.				EMERSION.				ANGLE FROM VERTEX.			
			Longitude				Longitude				Longitude			
			h m	h m	h m	h	h m	h m	h m	h	h m	h m	h m	h
			1 30	2	2 30	3	1 30	2	2 30	3	1 30	2	2 30	3
Sept. 16	Capricor. 4½	30	*16 38	16 28	16 13	16 1	*16 38	16 46	16 53	16 56	Star	241°	222°	205°
		35	*16 17	16 11	16 3	15 53	.....	*16 57	16 59	16 59	1's.	207	195	182
		40	*16 6	16 2	15 56	15 49	.....	.....	*17 0	16 58	.....	.....	172	162
		45	*15 58	15 55	15 51	15 46	.....	.....	*16 57	16 54	.....	.....	153	142
											Star			
17	Aquarii 4	30	13 45	13 38	13 38	13 41	14 55	14 39	14 12	13 41	132	110	77	2's.
		35	13 54	13 58	13 59	.....	14 45	14 22	13 59	.....	105	75	Star	2'30"
		40	14 19	.....	.....	.....	14 19	.....	.....	.....	Star	15"	n.	n.
		45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
											Star			
23	μ Ceti 5	30	17 17	16 52	16 11	15 46	17 17	16 59	17 8	17 1	3'n.	230	183	144
		35	17 0	16 32	16 8	15 50	17 42	17 36	17 27	17 14	211	195	169	135
		40	16 49	16 29	16 11	15 56	18 0	17 49	17 37	17 24	188	172	151	126
		45	16 46	16 30	16 16	16 5	18 6	17 55	17 42	17 29	165	151	133	113
25	Rumk. 1136 6	30	12 48	12 44	12 44	12 45	13 56	13 50	13 46	13 42	63	52	43	35
		35	12 55	12 52	12 52	12 53	14 6	13 58	13 52	13 48	58	47	36	28
		40	13 4	13 2	13 2	13 4	14 14	14 6	13 59	13 54	53	42	31	23
		45	13 15	13 14	13 14	13 16	14 21	14 12	14 4	13 58	49	36	25	15
25	63 Tauri 6	30	17 27	17 3	16 44	16 30	18 47	18 31	18 14	17 57	195	167	117	74
		35	17 25	17 7	16 51	16 39	18 55	18 39	18 21	18 4	165	144	108	73
		40	17 28	17 13	17 1	16 51	18 57	18 41	18 24	18 7	140	121	94	68
		45	17 34	17 22	17 12	17 5	18 55	18 40	18 24	18 6	117	101	79	52
25	Rumk. 1189	30	20 6	19 49	19 24	18 53	20 34	20 20	20 6	19 52	236	235	224	205
		35	19 45	19 28	19 8	18 46	20 50	20 37	20 23	20 7	197	197	191	175
		40	19 35	19 20	19 4	18 46	20 52	20 41	20 28	20 14	171	169	164	151
		45	19 31	19 18	19 4	18 50	20 50	20 40	20 28	20 16	147	146	138	129
25	Rumk. 1192	30	19 53	19 37	19 18	19 0	21 13	21 3	20 49	20 32	151	154	153	145
		35	19 56	19 42	19 26	19 12	21 5	20 56	20 42	20 26	126	127	125	115
		40	20 7	19 53	19 40	19 30	20 50	20 41	20 29	20 12	97	97	93	78
		45	20 24	.....	.....	.....	20 24	.....	.....	.....	Star	2'n.	.....	.....
											Star			
26	m Tauri 5½	30	12 36	12 40	12 48	12 59	13 24	13 17	13 9	12 59	4	352	337	30'n.
		35	12 50	13 1	13 5	.....	13 23	13 10	13 5	.....	349	328	Star	2'n.
		40	13 13	.....	.....	.....	13 13	.....	.....	.....	Star	30"	n.	.....
		45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
											Star			
27	χ³ Orionis 5	30	13 54	13 43	13 37	*13 36	13 54	14 2	14 10	14 15	2's.	110	93	84
		35	13 46	13 40	13 37	13 38	14 15	14 19	14 22	14 25	105	91	81	73
		40	13 46	13 42	13 41	13 42	14 32	14 32	14 33	14 34	90	80	73	65
		45	13 49	13 47	13 46	13 47	14 45	14 43	14 42	14 43	81	73	66	60
27	χ⁴ Orionis 5	30	13 51	13 53	13 59	14 7	14 48	14 40	14 33	14 24	8	357	346	328
		35	14 4	14 9	14 22	.....	14 49	14 38	14 22	.....	356	342	Star	15'n.
		40	14 22	14 30	.....	.....	14 44	14 30	.....	.....	336	Star	1'15"	n.
		45	14 41	.....	.....	.....	14 41	.....	.....	.....	Star	2'15"	n.	.....
											Star			
Oct. 11	B.A.C. 6561 6	30	.....	.....	9 54	9 12	.....	.....	9 54	9 56	Star	.....	5's.	182
		35	10 12	9 48	9 25	9 5	10 12	10 20	10 17	10 7	1's.	201	179	162
		40	9 52	9 33	9 16	8 58	10 31	10 28	10 21	10 11	196	177	162	148
		45	9 39	9 25	9 10	8 55	10 34	10 29	10 22	10 12	175	162	148	136
24	χ¹ Orionis 4½	30	16 50	16 29	16 11	15 57	18 22	18 3	17 43	17 25	172	151	87	49
		35	16 50	16 32	16 17	16 6	18 22	18 5	17 46	17 28	140	121	80	46
		40	16 54	16 40	16 28	16 18	18 18	18 2	17 44	17 26	112	95	63	35
		45	17 3	16 51	16 41	16 35	18 9	17 54	17 37	17 20	84	67	42	18
27	δ Cancri 4	30	17 34	17 19	17 6	16 56	18 49	18 30	18 15	18 3	66	52	48	43
		35	17 30	17 17	17 6	16 58	18 53	18 37	18 22	18 10	61	46	37	32
		40	17 31	17 19	17 10	17 3	18 53	18 38	18 25	18 13	50	37	29	22
		45	17 37	17 27	17 18	17 12	18 49	18 38	18 25	18 14	36	27	18	11

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# OCCULTATIONS, 1869.

OCCULTATIONS OF STARS AND PLANETS BY THE MOON, VISIBLE IN THE TERRITORY OF THE UNITED STATES WEST OF THE MISSISSIPPI RIVER.															
Date. 1869.	Star's Name and Magnitude.	Latitude.	IMMERSION.				EMERSION.				ANGLE FROM VERTEX.				
			Longitude				Longitude				Longitude				
			h 1 30	m 2	h 2 30	m 3	h 1 30	m 2	h 2 30	m 3	h 1 30	m 2	h 2 30	m 3	
Nov. 11	50 Aquarii 6	30 35 40 45	..... ..... ..... 11 39	..... ..... 11 30 11 14	..... ..... 11 8 10 54	..... ..... 11 2 10 36	..... ..... ..... 11 39	..... ..... 11 30 11 48	..... ..... 11 35 11 48	..... ..... 11 37 11 45	..... ..... Star 30''s	..... ..... Star 2's.	..... ..... 211	..... ..... 191 172	
12	ψ <sup>1</sup> Aquarii 4½	30 35 40 45	..... ..... *14 40 14 27	..... ..... 14 35 14 23	..... ..... 14 54 14 18	..... ..... 14 51 14 11	..... ..... ..... .....	..... ..... *15 13 *15 17	..... ..... 15 15 15 18	..... ..... 15 6 15 17	..... ..... 14 51 15 6	..... ..... Star 0''s	..... ..... 213	..... ..... 208 182	..... ..... 199 175
21	15 <sup>2</sup> Gemin. 6	30 35 40 45	..... ..... ..... .....	..... ..... 12 0 12 15	..... ..... 11 59 12 12	..... ..... 12 1 12 13	..... ..... 13 13 13 16	..... ..... 12 58 13 3	..... ..... 12 49 12 51	..... ..... 12 41 12 42	..... ..... 38 23	..... ..... 28 10	..... ..... 18 356	..... ..... 8 338	
21	16 Geminor. 6	30 35 40 45	..... ..... ..... .....	..... ..... 12 5 12 15	..... ..... 11 57 12 6	..... ..... 11 52 12 1	..... ..... 13 14 13 8	..... ..... 12 34 13 8	..... ..... 12 37 12 52	..... ..... 12 37 12 49	..... ..... 30''s 104	..... ..... 108 89	..... ..... 91 79	..... ..... 80 70	..... ..... 15''s 71
22	56 Geminor. 5½	30 35 40 45	..... ..... ..... .....	..... ..... 11 0 11 4	..... ..... 10 56 11 3	..... ..... 11 56 11 4	..... ..... 10 57 11 6	..... ..... 11 41 12 4	..... ..... 11 43 12 2	..... ..... 11 45 12 0	..... ..... 11 47 12 0	..... ..... 79 55	..... ..... 68 48	..... ..... 60 41	..... ..... 52 35
Dec. 14	μ Ceti 5	30 35 40 45	..... ..... ..... .....	..... ..... 14 5 13 39	..... ..... 13 41 13 38	..... ..... 13 13 13 20	..... ..... 14 38 13 0	..... ..... 14 31 14 43	..... ..... 14 1 14 37	..... ..... 14 23 14 29	..... ..... 13 58 14 14	..... ..... 210 183	..... ..... Star 30''s	..... ..... 240 180	..... ..... 219 174
16	63 Tauri 6	30 35 40 45	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....
16	Rumk. 1192	30 35 40 45	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....
16	Rumk. 1212 6	30 35 40 45	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....
17	π Tauri 5½	30 35 40 45	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....
18	χ <sup>1</sup> Orionis. 5	30 35 40 45	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....
19	56 Geminor. 5½	30 35 40 45	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....
22	34 Leonis 6	30 35 40 45	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....	..... ..... ..... .....

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